EFFECT OF GOVERNMENT CONTROL ON THE PERFORMANCE OF UPSTREAM OIL AND GAS COMPANIES IN NIGERIA

By

Sunusi Sa'ad Ahmad

A Thesis Submitted to Dundee Business School, Abertay University,
in Partial Fulfilment of the Requirements for the Award of
Doctor of Philosophy
December 2014

Abertay University

Dundee Business School

Certification

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I certify that this thesis is the true and accurate version as approved by the examiners, and that all relevant ordinance regulations have been fulfilled.

Signed Principal Supervisor: [redacted] /12/14

Declaration

I, Sunusi Sa'ad Ahmad, hereby declare that this thesis is my own original work and has not been submitted elsewhere in fulfilment of the requirement of any other award. Sufficient efforts have been made by my humble self and my supervisors in ensuring that works of others have been properly and diligently acknowledged.

Signed: [redacted] Date: 19/12/2014

Acknowledgement

All praises be to Allah SWT whose blessings and favours upon us made everything we do possible; I cannot but remained grateful to Him forever.

My sincere appreciation goes to my mother for her continued prayer, love and affection which keep me on the right track always; may Allah SWT reward her accordingly. I also pray to almighty Allah SWT to reward my late father accordingly for his instrumental role for what I have achieved in life.

The understanding of my beloved wife and daughters during my study was quite instrumental towards accomplishing this thesis. I, therefore, remained grateful to them for their love and understanding. Similarly, my appreciation goes to my brothers, sisters, relatives, colleagues, friends, all and sundry (too numerous to mention) for their prayers and support before, during and after my study. May Allah SWT reward them accordingly.

Prof. Reza Kouhy is somebody that requires a special monograph of appreciation for his able and distinguished supervision on this thesis. His guidance and critical comments on this PhD thesis were quite useful. I will always remember his priceless advice on the need for me to always strive for the best in my academic endevours and work within the boundaries of professional ethics at all times. Thank you Sir!!!

Lastly and most importantly is to appreciate the scholarship assistance awarded to me by Tetfund and the study fellowship granted to me by my

employer - Usmanu Danfodiyo University Sokoto (UDUS); I sincerely appreciate the confidence and trust of my employer in me for granting me the such fellowship. Therefore, I hereby ***dedicate this thesis to UDUS and its entire staff***. I will forever remain grateful to UDUS for such a huge investment in my humble self and I will endevour to make the knowledge I acquired beneficial to humanity; may Allah SWT give us the ability and wisdom to impart the knowledge in the most useful, unpretentious and modest manner.

Finally, we sincerely ask for Allah's forgiveness in all the errors we might have committed unknowingly and the mistakes we might have made subconsciously.

Abstract

International Oil Companies (IOCs) and Oil-rich nations (States) pool their resources together in order to explore for and exploit oil in the most effective and efficient manner. The IOCs are entrusted with the exploration and exploitation activities due to their technological expertise and financial capability. However, the uncertainties surrounding the exploration for oil constitute the major source of risks in upstream operations. Similarly, moral hazard and adverse-selection problems emerge during the exploitation of oil reserves. Hence, States adopt a number of control mechanisms in order to maximise their take from the oil reserves. Thus, establishing Joint Venture Companies (JVCs) is considered to be one of such control mechanisms. The Nigeria Government has ownership (about 57%) in the JVCs operating in the upstream sector. The JVCs operate alongside other upstream oil and gas companies (non-JVCs) that do not have Government ownership. This study adopts an agency theory in order to critically analyse the principal-agent relationship expounded above. Therefore, using a multivariate regression analysis based on a panel dataset of monthly observations (1999 – 2007) this study examines the cost efficiency and gross margin of both the JVCs and non-JVCs with the aim of determining whether or not Government ownership in the JVCs has any significant and systematic effect on their performance. Findings of the study indicate that JVCs are more efficient and more profitable than the non-JVCs, as non-JVCs spend twice as much as the JVCs to produce a barrel of crude oil. Hence, it can be concluded that Government ownership really matters in improving the cast efficiency and gross margin of the upstream oil and gas companies operating in Nigeria. Similarly, due to perennial funding problem bedeviling the operations of the JVCs in Nigeria, an alternative funding (AF) arrangement was introduced in 2003; so that the companies will provide funds as loan to cover for the Government share of funding shortfalls. Effect of the AF arrangement on performance of the companies on one hand and Government Take on the other hand was determined by using Wilcoxon Sign Tests on both the pre-alternative and post-alternative funding performance measures such as capital expenditures, companies' gross margin, companies' drilling activities and Government Take. Findings of the study indicate that the alternative funding arrangement improved capital expenditures made by the upstream oil and gas companies as well as their gross margin. However, the findings indicate that such arrangement did not improve drilling activities. Therefore, the implication of these findings is that policy makers need to review such arrangement in such a way that not only the upstream oil and gas companies benefit from such arrangement but also the Government.

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List of Abbreviations

AF	ALTERNATIVE FUNDING
AENR	AGIP ENERGY AND NATURAL RESOURCES
ASB	ANNUAL STATISTICAL BULLETIN
CAPEX	CAPITAL EXPENDITURE
CNL	CHEVRON NIGERIA LIMITED
CBN	CENTRAL BANK OF NIGERIA
DEA	DATA ENVELOPMENT ANALYSIS
DMO	DOMESTIC MARKET OBLIGATIONS
DPR	DEPARTMENT OF PETROLEUM RESOURCES
EBIT	EARNINGS BEFORE INTEREST AND TAX
E&P	EXPLORATION AND PRODUCTION
FEM	FIXED EFFECTS MODEL
FIRS	FEDERAL INLAND REVENUE SERVICE
HSE	HEALTH SAFETY AND ENVIRONMENT
IOCS	INTERNATIONAL OIL COMPANIES
JOA	JOINT OPERATING AGREEMENT
JVCS	JOINT VENTURE COMPANIES
LSDV	LEAST SQUARE DUMMY VARIABLE
MDAS	MINISTRIES DEPARTMENT AND AGENCIES
MFOS	MARGINAL FIELD OPERATORS
MPNU	MOBIL PETROLEUM NIGERIA UNLIMITED
NAPIMS	NATIONAL PETROLEUM INVESTMENT MANAGEMENT SERVICES
NAOC	NIGERIA AGIP OIL COMPANY
NEITI	NIGERIA EXTRACTIVE INDUSTRIES TRANSPARENCY INITIATIVE

NETCO	NATIONAL ENGINEERING AND TECHNICAL COMPANY
NLNG	NIGERIA LIQUEFIED NATURAL GAS
NDDC	NIGER DELTA DEVELOPMENT COMMISSION
NGC	NIGERIA GAS COMPANY
NNPC	NIGERIA NATIONAL PETROLEUM CORPORATION
NNRA	NIGERIA NUCLEAR REGULATORY AGENCY
NNOC	NIGERIA NATIONAL OIL COMPANY
NOARA	NON-OIL AND GAS REVENUE
NOCS	NATIONAL OIL COMPANIES
NON-JVCS	NON-JOINT VENTURE COMPANIES
NPDC	NIGERIA PETROLEUM DEVELOPMENT COMPANY
NUPENG	NIGERIA UNION OF PETROLEUM AND NATURAL GAS WORKERS
OGRA	OIL AND GAS REVENUE
OPEC	ORGANISATION OF THE PETROLEUM EXPORTING COUNTRIES
OLS	ORDINARY LEAST SQUARE
OML	OIL MINING LICENCE
OPEX	OPERATING EXPENDITURE
OPL	OIL PROSPECTING LICENCE
PENGASSAN	PETROLEUM AND NATURAL GAS SENIOR STAFF ASSOCIATION OF NIGERIA
PIB	PETROLEUM INDUSTRY BILL
PPMC	PETROLEUM PRICING AND MARKETING COMPANY
PSCS	PRODUCTION SHARING CONTRACTS
PTDF	PETROLEUM TECHNOLOGY DEVELOPMENT FUND
REM	RANDOM EFFECTS MODEL
SD	STANDARD DEVIATION

SCS	SERVICE CONTRACTS
POOC	PAN-OCEAN OIL COMPANY
PPT	PETROLEUM PROFIT TAX
SPDC	SHELL PETROLEUM DEVELOPMENT COMPANY
TEPNG	TOTAL EXPLORATION PETROLEUM NIGERIA
VAT	VALUE ADDED TAX

CHAPTER ONE: INTRODUCTION

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1.1 Statement of the Research Problem

Upstream activities require intensive capital investment. While on the one hand oil-rich nations (states hereafter) are endowed with huge oil reserves, but lack the capacity to explore for and exploit their oil reserves, on the other hand international oil companies (IOCs hereafter) who have the required funds and expertise are willing to invest their funds for good returns (Bindemann, 1999). Therefore, the IOCs and the states pool their resources together in order to explore for and exploit oil in the most effective and efficient manner. However, the uncertainties surrounding the discovery of oil, despite the intensive capital investment, constitute the major source of risks in upstream operations (Wright and Gallun, 2008). These risks may be geological, prospect, political, regulatory, or commercial (Johnston, 1994).

Consequently, before the IOCs take-up such risks, that may or may not result to oil discovery, they need to be motivated by the states via an effective incentive-system (Bindemann, 1999). Similarly, moral hazard and adverse-selection problems (explained in chapter 3) emerge with the discovery of oil reserves (Pongsiri, 2004). It can be argued, however, that these problems do arise because the value of assets (oil reserves) is not contractible; hence, whoever has ownership in the asset in question receives maximum value (Gibbons, 2005a). Thus, there is the need for an optimal incentive system to effectively govern the agency relationship between the

IOCs and the states (ibid.). It is important to note that an optimal incentive-system facilitates such risk-taking behaviour by the IOCs on the one hand and increases oil revenue (government take hereafter) to the states on the other.

Aside the inherent risks associated with upstream operation, another distinctive feature of the upstream operation is that, the relationship between the IOCs (agents) and the states (principals) is governed by different petroleum fiscal systems around the world, these include concessionary, contractual, and hybrid[1] systems (Johnston, 1994). Each of these systems is governed by different fiscal terms informing the operational relationship, incentive-system, performance measurement, and reward system in a particular country or agreement(s) within a country. Therefore, agent's actions ex-ante (before uncertainties are resolved) and the principal's decisions ex-post (after uncertainties are resolved) are influenced by the nature of fiscal terms involved in a particular contractual relationship (Gibbons, 2005b).

To this end, fiscal terms used by the principal in a particular fiscal system, ex-ante actions chosen by the agent, ex-post decisions taken by the principal, payoff received by both parties, control mechanisms and performance measures adopted by the principal, and the effect of such control on the performance of the agent are issues this study aims to

[1] This is a joint operation between an IOC with another IOC or national oil company (NOC) of the oil-rich nation with an IOC

address. To address these issues, agency theory is adopted. Agency theory is applied in analysing contractual relationships between parties to a particular contract or joint operations among parties involved in a particular venture (Pongsiri, 2004; Gibbons, 2005a). Hence, agency theory is adopted, in this study, in order to analyse the performance of upstream oil and gas companies operating in Nigeria that have different ownership status and operate under different petroleum fiscal regimes[2].

Government participates in the upstream oil and gas companies in order to control the activities of such companies and maximise its share from its oil resources. The control mechanism in the context of this study refers to the Government ownership in the joint venture companies (JVCs). However, the question here is to what extent such government ownership affects the performance of the upstream oil and gas companies in Nigeria. This question is central to all oil-rich nations around the world, as to how can the oil-rich nations maximise their benefits from their oil resources while providing adequate control and attractive incentives for investment in their countries (Kemp and Stephens, 1996).

[2] This is the name used (in Nigeria) to identify upstream oil and gas companies such as: joint venture companies, production-sharing, and service contracts. These companies operate as joint ventures between Nigerian National Oil Company (NOC) and IOCs on the one hand and production-sharing contract between the NOC (principal) and IOCs (agents) on the other.

1.2 Aim and Objectives of the Study

The study aims to investigate the effect of government control on the performance of upstream oil and gas companies in Nigeria. Other specific objectives of the study include:

i) to investigate the extent to which government ownership in the JVCs affects cost efficiency of the upstream oil and gas companies;

ii) to investigate the extent to which government ownership in the JVCs affects gross margin of the upstream oil and gas companies;

iii) to investigate the extent to which the alternative funding arrangement introduced affects performance[3] of the upstream oil and gas companies;

iv) to investigate the extent to which the alternative funding arrangement introduced affects Government Take.

1.3 Motivation for the Study

Despite their strategic role in the global economy, upstream oil and gas companies have received little attention in terms of research on their performance (Wolf, 2008). Additionally, the few studies conducted are mostly regarding their operations in the developed countries (see for example Al-Obaidan and Scully, 1991; Al-Mazeedi, 1992; Victor, 2007; Hartley and

[3] The performance metrics considered include both financials (production efficiency and gross margin) and non-financials (drilling activities).

Medlock, 2008; Wolf and Pollitt, 2008; Wolf, 2009; Eller *et al.,* 2011), with few studies on the developing countries like Libya (Mahmud and Russell, 1999), Indonesia (Sihotang, 2003), and Nigeria (Gidado, 1992; Alalade, 2004).

In Nigeria, for example, Alalade's (2004) study indicates that fiscal terms negatively affected performance of the upstream oil and gas companies, and government take is not affected by contract type. Similarly, Gidado (1992) argues that government ownership in the upstream oil and gas companies does not accord government any significant control over the upstream oil and gas companies because the government officials on the management boards of the joint venture companies lack the requisite skills needed for understanding the upstream activities.

From the foregoing, the gaps identified in the literature which makes this study different from the previous ones include the following:
While Alalade's (2004) study is limited to financial indicators and focused on only three companies (two JVCs one non-JVC) this study investigates the performance of nine upstream oil and gas companies (five JVCs and four non-JVCs). Therefore, this provides us with a more comprehensive picture on the performance of the upstream oil and gas companies.

The performance indicators investigated in this study include both the financials and non-financials. This is particularly important because an investigation on non-financial performance indicators, such as drilling activities, alongside the financial performance indicators, such as cost efficiency and gross margin, could provide a very useful index for understanding performance of upstream oil and gas companies.

Overall, this study is the first of its kind that investigates the performance of upstream oil and gas companies operating in Nigeria using a monthly panel dataset on both the financial and non-financial performance metrics.

1.4 Scope of the Study

This study builds on the previous studies by investigating the effect of government control on the performance of oil and gas companies, but this study focuses on the upstream oil and gas companies operating in Nigeria. Additionally, in order to understand the performance metrics beyond the narrow view of profitability alone, both financial and non-financial performance measures are considered in this study. As Boardman and Vining (1989) argue, when comparing performance differentials of companies, lower profit does not necessarily signify inefficiency.

Considering the complexities and interdependence nature amongst the various factors affecting the performance of upstream oil and gas companies, Boardman and Vining's (1989) argument is especially important in the context of this study. Some of the important performance measures considered in this study include: drilling activities (exploration and development), capital expenditure (CAPEX), operating expenditure (OPEX) and output (oil & gas).

1.5 Outline of the Thesis

This thesis is composed of six chapters. The first chapter provides us with the general introduction about the thesis. This includes the statement of the research problem, motivation for undertaking the study, aim and objectives of the study, research hypotheses, scope of the study, and the outline of the thesis.

Chapter two is divided into three sub-sections, focusing on conceptual issues on the upstream oil and gas companies, theoretical framework underpinning the study, and findings of previous studies on the effect of Government control on the performance of companies respectively.

Chapter three provides us with the detailed account on the institutional and regulatory framework in the Nigerian oil and gas industry. This account is preceded by the history of oil exploration in Nigeria. This study is the first of its kind to provide a comprehensive institutional framework in the Nigerian upstream oil and gas sector with a clear categorization of the various stakeholders into ‘stake-holders’, ‘stake-keepers’, and ‘stake-watchers’. This categorization is followed by a discussion on the various legislation governing the affairs of the upstream oil and gas sector in Nigeria.

Chapter four focuses on the research methodology adopted in the study and the research methods used to collect and analyse data.

Chapter five is where the data collected were presented and analysed using the appropriate tools identified in chapter four.

Finally, chapter six is where the summary of findings is presented and conclusions from such findings are made. Contributions made by the study are also enumerated. Accordingly, limitations of the study and areas of future research are also enumerated.

CHAPTER TWO:

LITERATURE REVIEW ON THE EFFECT OF GOVERNMENT CONTROL ON COMPANIES' PERFORMANCE

CHAPTER TWO: LITERATURE REVIEW ON THE EFFECT OF GOVERNMENT CONTROL ON COMPANIES' PERFORMANCE

2.1 Introduction

This chapter is structured into five sections as follows. Section 2.2 discusses conceptual issues on the upstream oil and gas companies. Section 2.3 provides theoretical framework underpinning the study. Prior studies on the effect of government control on the performance of companies are synthesised in section 2.4. Finally, chapter summary is provided in section 2.5.

2.2 Conceptual Framework

This section provides a brief discussion on different kinds of agreements/ contracts under which the upstream oil and gas companies operate. These include Concessionary Agreement (CA); Joint Venture Companies (JVCs); Production-sharing Contracts (PSCs), Service Contracts (SC), and the Marginal Field Operation (MFO).

2.2.1 Concessionary Agreement

The traditional concessionary agreement in oil exploration is considered the first generation of petroleum exploration contracts. Concessionary agreement is defined by William and Meyers (1962, p. 150)[4] in (Gidado, 1992) as:

> *"an agreement permitting a foreign petroleum company to prospect for and produce oil in the area subject to the agreement. The terms ordinarily include a time limitation and a provision for royalty to be paid to the government".*

Some of the basic features of concessionary system include the following. Firstly, development rights granted to the IOCs cover a vast area or even the entire country. Secondly, contracts are for a long period. Lastly, and perhaps the most important is that, the IOCs have absolute control over their operations; which accords them with opportunity to determine when to produce and how much to produce. Hence, it is argued that the IOCs may manipulate their operations to their own advantage (Bindemann, 1999). For example, productions may be lowered when oil prices are low, which in turn reduces the oil revenue accruable to the states.

Consequently, some of the oil-rich nations who are still operating the concessionary system take some corrective measures to address such anomalies. Hence, the modern concessionary agreements are being structured in such a way to provide for shorter contract period, work obligation for the IOCs, relinquishment clause at the expiration of agreed period, higher royalties, and option for state participation, which is being referred to as 'concessionary joint venture' (Johnston 1994).

Although the concessionary agreement was the first type of petroleum exploration contract in Nigeria, as in the case of German Bitumen Company, and Shell D'Arcy Petroleum Company in 1908 and 1937 respectively (Oromade, 1986), the concessionary system does not exist anymore in

Nigeria. At present, upstream oil and gas companies operate under either of the following: JVC, PSC, SC, and MFO. These are discussed hereunder.

2.2.2 Joint Venture Companies

Joint Venture Companies (JVCs) emerged when oil-rich nations wanted to reclaim control of their oil resources; as against the previous status under the concession agreements where they simply received royalties and taxes from the IOCs (OPEC, 2008). This paradigm shift in the 1970s changed the status of oil-rich nations from 'landlords to entrepreneurs' (Klapp, 1982). More so, membership of OPEC is considered to be the major momentum towards such paradigm shift (Gidado, 1992). For example, OPEC demanded its members to modify the traditional concessionary agreements in order to participate in the exploration and exploitation of their oil resources; the OPEC policy statement states that:

> *"Where provision for the governmental participation in the ownership of the concession holding company under any of the present contracts has not been made, the government may acquire a reasonable participation, on the grounds of the principle of changing circumstances. If such provision has actually been made, but avoided by the operators concerned, the rate provided for shall serve as a minimum basis for the participation to be acquired"* (Adedeji, 1977, p. 374).

Under the JVCs, both the IOCs and the oil-rich nations (represented by their NOCs) participate in upstream operations. Production output and costs are shared on a pro-rata basis between the JV partners involved. Therefore, the oil-rich nations do not only receive royalties and taxes but also share in the equity oil. Similarly, the IOCs share with the oil-rich nations costs of production which is funded via particular funding agreement (Wright and Gallun, 2008). Table 1 below presents JVCs in Nigeria.

As can be seen in Table 1, the Nigerian government (being represented by the Nigeria National Petroleum Corporation - NNPC) has a controlling stake in all the six JVCs currently operating in Nigeria. However, due to obvious reasons such as the technical know-how required in upstream operation and the risk capital needed for investment in the JVCs which are readily at the disposal of the IOCs, the JVCs are being operated by the IOCs. Hence, NNPC is a non-operator in all the JVCs.

It, therefore, can be discerned from the foregoing that the two most important reasons upon which the JVCs were formed are aimed at transferring technical know-how to Nigerians and addressing funding problem associated with upstream operations.

Table 1: Oil and Gas Joint Venture Companies in Nigeria

S/N	Joint Venture Company	Joint Venture Partners and Their Working Interest in %								Total
		Non-Operator	Joint Venture Operators - IOCs							
		NNPC	Shell	Chevron	Mobil	Agip	Elf	Texaco	Phillips	
1	Shell Petroleum Development Company of Nigeria Limited (SPDC)	55	30	-	-	5	10	-	-	100
2	Chevron Nigeria Limited (CNL)	60	-	40	-	-	-	-	-	100
3	Mobil Producing Nigeria Unlimited (MPNU)	60	-	-	40	-	-	-	-	100
4	Nigerian Agip OilCompany Limited (NAOC)	60	-	-	-	20	-	-	20	100
5	Elf Petroleum Nigeria Limited (EPNL)	60	-	-	-	-	40	-	-	100
6	Texaco Overseas Petroleum Company Unlimited (TOPCON)	60	-	20	-	-	-	20	-	100

Source: Hassan (2012, p. 36)

The JVCs are funded by either billing or cash-call system. The billing system requires the operator to bill other partners after the expenditures are made, but under the cash-call system the operator requests for payment of budgeted cash before the expenditures are made (Wright and Gallun, 2008). In Nigeria, for example, the JVCs are funded via a cash-call system. However, the Government share of cash-call funding is constrained by other financial needs which results to a delay in funding of the JVCs.

These short-falls in government funding necessitates the need for alternative funding for the JVCs (Ameh, 2005; Ariweriokuma, 2009). The alternative funding arrangements are made in such a way that the IOCs advance loans to the JVCs in order to finance Government's share of funding; so as to avoid unnecessary delays in the operations. With the introduction of these alternative funding arrangements in 2003, the expectation is that JVCs will perform better in the post-Alternative Funding period, since the funding problems are supposedly addressed; hence, the following questions (RQ):

RQ 1: To what extent does alternative funding affect gross margin?

RQ 2: To what extent does alternative funding affect crude oil production?

RQ 3: To what extent does alternative funding affect Government take?

RQ 4: To what extent does alternative funding affect capital expenditure?

RQ 5: To what extent does alternative funding affect exploration activities?

RQ 6: To what extent alternative funding affects development activities?

In the course of the literature review in this PhD project, the following eight hypotheses have been developed in order to address the research questions raised above; these hypotheses are as follows:

Hypothesis $_{1.0}$: Gross margin is not significantly higher in the post-alternative funding period

Hypothesis $_{1.A}$: Gross margin is significantly higher in the post-alternative funding period

Hypothesis $_{2.0}$: Crude oil production is not significantly higher in the post-alternative funding period

Hypothesis $_{2.A}$: Crude oil production is significantly higher in the post-alternative funding period

Hypothesis $_{3.0}$: Government take is not significantly higher in the post-alternative funding period

Hypothesis $_{3.A}$: Government take is significantly higher in the post-alternative funding period

Hypothesis $_{4.0}$: Capital expenditure is not significantly higher in the post-alternative funding period

Hypothesis $_{4.A}$: Capital expenditure is significantly higher in the post-alternative funding period

Hypothesis $_{5.0}$: Exploration activities are not significantly higher in the post-alternative funding period

Hypothesis $_{5.A}$: Exploration activities are significantly higher in the post-alternative funding period

Hypothesis $_{6.0}$: Development activities are not significantly higher in the post-alternative funding period

Hypothesis $_{6.A}$: Development activities are significantly higher in the post-alternative funding period

The hypotheses developed above have been tested using the relevant data collected, as aptly stated by Blaikie (2010, p. 76):

> *"a hypothesis is not produced by a deductive machine... it is a product of creative imagination, of a mind which absorbs... data until it sees them fall into a pattern"*

Having explained the operational structure of the JVCs above, the section below focuses on PSCs.

2.2.3 Production-sharing Contracts

As mentioned in section 2.2.1 above, the traditional concessionary agreement in upstream operation was considered very exploitative (OPEC, 2008). Hence, increased criticisms on the exploitative nature of the old concessionary system on one hand and the perennial funding problems associated with the operations of the JVCs on the other hand paved way for the introduction of PSC (Bindemann, 1999; Pongsiri, 2004; Sihotang, 2003). Indeed, the introduction of PSC in Nigeria was informed by the aforementioned perennial funding problems under the JVCs (Ameh, 2005; Ariweriokuma, 2009; Alalade, 2004).

The first PSC was introduced in Indonesia in the 1960s, which was modeled after the agricultural crop sharing contract (Sihotang, 2003). PSC is defined by William and Meyers (1962) in Gidado (1992, p. 194) as:

> *"a contract for the development of mineral resources under which the contractor's costs are recoverable each year out of the production but there is a maximum amount of the production which can be applied to this cost recovery in any one year. This share of oil produced is referred to as 'cost oil'. The balance of the oil is regarded as 'profit oil' and is divided in the profit sharing ratio - for instance, 55% to the government. After the contractor has recovered its investment, the amount of 'cost oil' will drop to cover operating expenses by a corresponding amount ..."*

One fundamental difference between PSC and concessionary system is that, while ownership of petroleum resources rests with the IOCs under the concessionary system, under the PSC ownership of petroleum resources rests with the states (Pongsiri, 2004). Similarly, the difference between PSC and JVC is that while the state must fund the JV operation based on its stake-holding, under the PSC the state is not obliged for any financial commitment. Hence, the IOCs must bare all the costs and risks associated with the exploration activities.

In summary, PSC shields the states from the exploration risks; because the IOCs solely bear all the risks associated with investment in the exploration activities (Bindemann, 1999). That notwithstanding, states being the owners of the asset (oil reserves) not only share in the reward of oil discovered but also own the facilities emplaced by the contractors during the contractual period (Johnston, 1994). Even though the IOCs recover their cost of investment before production and/or profit is shared with the states (ibid.), moral-hazard and adverse selection problems normally characterise the relationship between states and IOCs (Pongsiri, 2004). For example, some of the vital aspects of the PSC are title to crude oil (Al-Attar and Alomair, 2005), work programs and expenditures (Johnston, 1994).

As succinctly stated by Johnston (1994, p. 160)

> *"The national oil company ... will have the right to make suggestions and propose revisions to any work plan and budget. However, the contractor normally has the authority to make final decisions on matters concerning the work program once the contract has been negotiated".*

Consequently, the IOCs have enormous control on what to do, how to do it, and when to do it. This, therefore, creates avenue for agency problems.

Discussion on PSC above indicates that problems may arise due to risk-averse attitude of states in the contractual relationship. Conversely, under the Service Contract (SC) states may carry all the risks involved (if it is a non-risk service contract) or share some of the exploration risks with the IOCs (if it is a risk service contract) an issue discussed hereunder.

2.2.4 Service Contracts (SC)

Unlike the PSC, under SC IOCs provide services for upstream activities. These services are of two categories, which are risk-service and non-risk service contracts. Under the risk-service contract, IOCs bear all the risks involved in exploration activities for a fixed fee. However, if the IOCs are paid a flat fee based on the services they render only without bearing the risks involved then the contract is called a non-risk service contract (Wright and Gallun, 2008).

Although the SC is similar to the PSC on the basis that IOCs do not own oil reserves, SC differs from the PSC from the perspectives of remunerations, control over operations, and risk-bearing (Bindemann, 1999). In Nigeria, for example, the only SC in operation is Agip Energy and Natural Resources Ltd (AENR).

In summary, the distinguishing features of the aforementioned petroleum fiscal regimes are attitude toward risk-taking; incentive-system, control mechanisms, and performance-reward relationship (see Table 2 below). For example, during the concessionary period, the IOCs assumed all the risks that were involved in the upstream operations; a situation that shielded the Nigerian Government from the risks that were involved in the operations. Nonetheless, the government take during that period was only from royalties and taxes, a situation that drastically changed when the JVCs were established.

Under the JVCs risks are shared between the states and the IOCs. Hence, costs of production as well as production output are shared on a pro-rata basis. It can be argued that JV operation combines both risk-sharing and high-powered incentive-system that motivates the IOCs to be more efficient.

On the other hand, operation under either the concessionary agreement or PSC is associated with huge risks on the part of IOCs and low-powered incentive-system because the IOCs do not share in the residual value of oil reserves. Also, the non-involvement of government in either the concessionary or PSC raises the question of cost 'gold-plating', which means that the longer it takes the IOCs to recover costs the lesser revenue accrues to the government (Pongsiri, 2004).

Table 2: Comparison of Petroleum Fiscal Regimes

Petroleum Fiscal Regime	IOC		NOC	
	Risks	***Reward***	***Risks***	*Reward*
Concession	Assumes all risks	Reward based on outcome	Assumes no risks	**Reward based on outcome**
PSC	Assumes all risks	Reward based on cost recovery	Assumes no risks	**Depends on cost recovery by the IOCs**
SC	Assumes no risks	Reward is fixed	Assumes all risks	**Reward varies**
JVCs	**Shares in risks**	**Reward based on stake-holding**	**Shares in risks**	**Reward based on stake-holding**

Adapted and edited: (Bindemann, 1999, p. 11).

Hence, the non-JVCs may be less efficient than their JV counterparts. Accordingly, "a partnership model pertaining to the principal-agent relationship can be used to explain how contracting parties behave in order to minimise the problems associated with their opportunistic behaviours" (Pongsiri, 2004, p. 437).

Under the concessionary system, IOCs make the entire investment and bear the full risks associated with such investment. In this case, the IOCs benefit the most under such arrangement when there is a positive outcome from their operations. Therefore, Government gets its reward from taxes and royalties. Similarly, IOCs make the entire investment and bear the full risk associated with such investment under the PSC. Such investment can only be recovered when there is positive outcome.

In this case, after the investment is recovered the reminder of the output (profit oil) is shared between the IOCs and the Government based on the pre-determined sharing ratio. Therefore, in the context of this study, it is assumed that the IOCs under the PSC may not be as efficient as expected due to the cost recovery issue that is solely at their discretion which is a very contentious issue in the upstream operations.

However, under the JVCs the IOCs work alongside the Government, where the IOC's reward is based on its stake-holding in the JVCs, thereby motivating the IOCs to be more efficient. This is possible where the Government is ready to participate in such ventures by making the required investment based on its stake-holding and bear the risk associated with such investment. Therefore, in the context of this study, it is assumed that the interest of the IOCs in JVCs is highly aligned with that of the Government, thereby motivating the JVCs to be more efficient and profitable than the non-JVCs.

Similarly, based on the Government ownership in the JVCs and its representation on the boards of such ventures, Government closely monitors the operations of the IOCs which are assumed to enhance the operations of the JVCs. Therefore, based on the aforementioned assumptions the study finds it very relevant to adopt an agency theory due to the principal-agent relationship expounded above. Consequently, further questions in relation to production efficiency and gross margin of the upstream oil and gas companies are raised in section 2.3.4.

Discussion on the theoretical framework underpinning this study is provided in the next section.

2.3 Theoretical Framework

Effect of ownership on companies' performance has been a subject for academic debate ever since Adam Smith asserts that "characters do not exist who are more distant than the sovereign and the entrepreneur" (Smith, 1776, p. 771)[5]. This debate centres on the efficacy of government involvement in business, i.e. whether or not state-owned enterprises perform

[5] Cited in Wolf and Pollitt (2008, p. 3)

as efficiently as private companies[6]. While the majority of empirical findings indicate that private companies are more efficient than the state-owned enterprises (see for example Villalonga, 2000), another strand of the literature indicates that state-owned enterprises are not intrinsically less inefficient than the private companies (see for example Dewenter and Malatesta, 2001).

Accordingly, expert opinion on this debate is that in the competitive market where there are no government intervention and other 'distortions', most theorists will argue that private companies are more efficient than their state-owned counterparts (Pestieau, 2006). However, Stiglitz (2007)[7] argues that such market conditions are rarely possible; hence theory alone may not give conclusive picture of performance differentials between private companies and state-owned enterprises (Laffont and Tirole, 1993).

That notwithstanding, a number of theoretical frameworks have been adopted by different theorists in different settings in investigating ownership effect on companies' performance. Some of these theories include public choice theory (Tullock, 1965; Buchanan, 1968; Ostrom, 2010)[8], property-rights theory (Alchain, 1965; Alchain and Demsetz, 1972; Denison and Klingler-Vidra, 2012), and agency theory (Jensen and Meckling, 1976; Fama, 1980; Aslan and Kumar, 2014).

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[6] See Table 4 for extensive review on empirical literature on whether or not state-owned enterprises perform as efficiently as private companies.
[7] Cited in (Wolf and Pollitt, 2008)
[8] See 7 above

Public choice theory is used in explaining the political decision-making results in outcomes that are contrary to the preferences of the general public (Tullock, 1965; Ostrom, 2010). Similarly, property rights theory is used in determining the ownership and usage of a particular asset (Alchain, 1965). On the other hand, agency theory is used in analysing the principal-agent relationship in a particular venture (Jensen and Meckling, 1976).

Hence, all of the aforementioned theories could be adopted in any study investigating ownership effect on companies' performance. However, considering the nature of oil and gas industry, where the owners (sovereign states - principals) of oil reserves are different from the managers (IOCs - agents) of the oil reserves, which creates the principal-agent relation between the states and the IOCs; and the high uncertainties and risks involved in the upstream operation that normally result to agency problems, this study finds it most appropriate to adopt agency theory as a theoretical framework. This is particularly important because of the high tendency of moral hazard and adverse selection problems that bedevil operations in the industry (Bindemann, 1999; Pongsiri, 2004; Sihotang, 2003). Agency theory is discussed hereunder.

2.3.1 Agency Theory

Agency theory focuses on the relationship between principal and agent and the costs of resolving conflicts of interest between them (Jensen and Meckling, 1976). The basic assumptions upon which the theory is founded are: agent is mostly driven by self-interest and tends to be risk-averse (Eisenhardt, 1989). Therefore, agent opts for short-term investment that guarantees his reward without necessarily taking into consideration the interest of his principal (Mustapha and Ahmad, 2011).

On the other hand, the principal prefers long-term investment that does not only provide him with a steady flow of income, but also the appreciation of his asset in the long-run (Solomon, 2009). Consequently, the divergent goals between the principal and his agent results to agency problems (ibid.). Thus, the principal adopts some control mechanisms in order to monitor the activities of his agent and measure his performance (Eisenhardt, 1989).

The literature on agency theory indicates a substantial use of different performance measures in order to measure the performance of agents. However, Ogden (1993) argues that the performance measures used in agency relationship may not necessarily capture the 'real' effort of agent in trying to establish the relationship between the input made by agent and the output resulting from such input; hence the problem of moral hazard and adverse-selection on the side of the agent (ibid.).

Overall, moral hazard and adverse-selection problems arise mainly because of the risk-averse attitude of both agent and principal which emerge due to divergent goals of both of them (Chikashi, 2011). Discussion on agency problems is provided hereunder.

2.3.2 Agency Problem

Agency problem arises when an agent does something contrary to what is ordinarily expected of him. The issue of agency problem in a principal-agent relationship was first identified, in the finance theory, by Adam Smith in 1776[9]. Smith argued that managers may not manage the resources of others as diligently as they would otherwise manage theirs. This problem is compounded due to fragmentation of ownership and control, which characterises agency relationship because the business owners (principals) appoint managers (agents) to manage their businesses (Solomon, 2009).

Consequently, while the agents are expected to run the businesses in a way that will maximise the principals' wealth; it is, however, argued that agents may pursue some goals that will enable them maximise their wealth rather than that of the principals', an issue normally referred as a moral hazard problem (Chikashi, 2011).

Similarly, while agents have first-hand information as a result of managing the business on a day to day basis, principals get information periodically which may be maneuvered by the agents, an issue that may result to an adverse-selection problem (Watson and Head, 2007). Considering the aforementioned complications, it can be deduced that agents are in a position to maximise their own wealth without necessarily being detected by the principals. In summary, agency problem arises when agents make

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[9] Smith, A. (1776) 'An Enquiry into the Nature and Courses of the Wealth of Nations, Oxford, The Clarendon Press, cited in Alalade (2004)

decisions that are contrary to that of principals' wealth maximisation. Hence, agency problems can be mitigated by instituting some control mechanisms by the principal, especially by owning a majority stake in the company in question. Therefore, this makes it pertinent to investigate the *extent to which Government ownership affects the performance*[10] *of the JVCs?*

Consistent with the question above, and considering that the representation at the management board of the JVCs is based on the stake-holding of a particular joint venture partner, this study assumes that JVCs perform better than the non-JVCs.

Detailed discussion on how a principal uses control mechanisms in an agency relationship is discussed hereunder.

2.3.3 Control Mechanisms in Agency Relationship

In order to mitigate the negative effect of agency problems on the principal-agent relationship, the principal needs to put in place some control mechanisms (Cragg and Dyck, 1997). However, the level of control mechanisms to be adopted depends on the extent of the perceived agency problem. It is important to note here that the extent of agency problem differs between private and state-owned companies.

[10] Performance here encapsulates both the financial and non-financial performance variables. Hence, the variables to be investigated, in order to address this research question and its related hypothesis include production efficiency, gross margin per barrel, exploration and development activities

Similarly, when comparing the extent of agency problem in both private and state-owned firms, Villalonga (2000) asserts that agency problem is less likely in the private firms due to some control mechanisms that naturally take care of such problems. These mechanisms include the existence of a market for ownership right, the threat of takeover of the management and bankruptcy due to inefficiency of the management, and the managerial labour market relationship. On the other hand, these mechanisms are lacking in the state-owned enterprises (Cragg and Dyck, 1997; Cragg and Dyck, 1997; Cragg and Dyck, 1998; Villalonga, 2000); which results to a higher likelihood of having more agency problems in the state-owned enterprises than in the private companies.

To this end, agency theory literature indicates that agency problems can be mitigated by either including some clauses in the contract that formalise punishment and reward (Jensen and Meckling, 1976) or by adopting effective control mechanisms (Eisenhardt, 1989). However, the inclusion of such clauses in contracts seems easier than adopting monitoring mechanisms which proved to be difficult and costly (Mustapha and Ahmad, 2011). That notwithstanding, an optimal incentive-system linked to performance of the agent may be more effective in addressing these problems (Watson and Head, 2007).

The performance-related incentive system aims at mitigating moral hazards and adverse selection problems which ultimately motivates the agents to maximise the principals' wealth. However, Ogden (1993) argues that whether the performance-related incentive-system works in addressing the agency problems is questionable. One of the problems in the performance-related incentive-system is the difficulty to establish a correlation between the agent's efforts and the business' performance because of the possibility that the performance indicators of the business may be maneuvered by the agent who has the advantage of information asymmetry (ibid.).

While the proponents of agency theory believe that performance-related incentive-systems can be used in addressing agency problems, others argued that the highly simplified assumptions portrayed by agency theorists alongside very complex models required to address such assumptions are not only difficult but unattainable in most cases (Scapens, 1984; Scapens 1985; Chua, 1986; Baiman, 1990; Ashton, 1991). Also, the inability of the theorists to address the performance measurement issues adds to the limitations of agency theory (Ogden, 1993). However, others are of the opinion that an optimal incentive-system can mitigate such problems; an issue discussed hereunder.

2.3.4 Incentive-system in Agency Relationship

The need for an optimal incentive system stems from the need to align the goals of principal and that of the agent which can mitigate the agency problems and ultimately result to an efficient performance by the agent. As succinctly stated by Courty and Marschke (2003, p. 270) "the moral-hazard model of incentive design is the main tool ... used to understand ... performance-measurement systems and the provision of incentives".

For example, following Sappington (1991) modeling of incentive-system, we can have the following assumptions on principal-agent relationship. The Principal may be accorded with the power to make a 'take-it-or-leave-it' contract offer to an agent. However, the agent may only accept the offer if the agent's expectations (expected pay-off) are exceeded. Therefore, there may be two possible outcomes in this contracting relationship.

The first scenario is the situation whereby the agent, working alongside the principal, uses the most efficient input for production; which in turn results to an increased surplus to both parties. This scenario is possible where the principal is not risk-averse (see Table 2 above, the case of JVCs) and the agent is motivated by having a share on the residual value of the asset. Consequently, agent's interest is aligned with that of the principal. The second scenario is where the principal is risk-averse and the agent does not share in the residual value of the asset (see Table 2 above, under the PSC). Consequently, there may be some friction in the principal-agent relationship.

Hence, a JVC whose reward is based on both measured performance and the residual value of the asset may produce more output (both oil and gas) than the PSC whose reward is only based on measured performance. More so, the closer cost monitoring under the JV operation, because the state is a partner in the operation, means that the JVCs may be more efficient[11] than the PSCs who solely operate and may manipulate their costs (Bindemann, 1999). In view of the forgoing assumptions, and in the context of upstream operations in Nigeria, the following research questions become very useful:

RQ 7: To what extent does government ownership, in the JVCs, affect the cost efficiency[12] of the JVCs?

RQ 8: To what extent does government ownership, in the JVCs, affect the gross margin[13] of the JVCs?

Consistent with the questions raised above, the following hypotheses are hereby formulated:

Hypothesis $_{7.0}$: Joint Venture Companies are not more efficient than the non-Joint Venture Companies

Hypothesis $_{7.A}$: Joint Venture Companies are more efficient than the non-Joint Venture Companies

Hypothesis $_{8.0}$: Joint Venture Companies are not more profitable than the non-Joint Venture Companies

[11] See research question (4) and its related hypothesis (4)
[12] Efficiency in the context of this study refers to the minimization of cost of production per barrel of oil. This is consistent with the measure of efficiency being used in the upstream sector, see Alalade (2004) as similar variable was used in the Nigerian context. Hence, this study adopts similar variable but using a different method of analysis (see chapter on Methodology and Methods for an in-depth analysis).
[13] See 12 above.

Hypothesis $_{8.A}$: Joint Venture Companies are more profitable than the non-Joint Venture Companies

Similarly, where the upstream oil company is faced with different tasks that are to be carried out within the limited resources available, a good incentive system serves not only to effectively allocate risks between the principal and an agent but also influences agent's attention between different tasks for efficient operation. In essence, a good incentive system can be used to address the problem of multi-product contract because of "... the desirability of providing incentives for any other activities that make competing demands on the agent's time and attention" (Holmstrom and Milgrom, 1991).

For example, an upstream oil company may produce either oil, gas or both oil and gas. In the first instance, if oil is considered the primary business of the company, then whatever comes from gas will be considered a reduction in the cost of oil produced (Taher, 2008). Therefore, an interesting question here is what motivates the companies to opt for the production of either of the two or the combination of the two?[14]

2.3.5 Agency Relationship in Upstream Operations

First of all, the issue of separation of ownership and control (Jensen and Meckling, 1976) and risk-averse attitude (Fama, 1980), as explained by the classical agency theory model, are analysed in the context of upstream

[14] This issue is beyond the scope of this PhD project and could be an area for further study

operation. In upstream operation, for example, the state (principal) engages an IOC (agent) in either JVC or PSC or SC.

Under the JV operation, the IOC and the state engage in a joint operation with the state having the largest stake-holding in the venture while the IOC is serving as the operator of the JVC. Hence, costs of operations as well as the outputs are shared between the state and the IOC on a pro rata basis. Although the IOC's inputs (operator's share of costs) are being monitored, but due to the problem of information asymmetry the state may find it difficult to confirm whether the inputs of the IOC are the best chosen for a particular combination of outputs[15]. Pongsiri (2004) states that, the information asymmetry issue in agency relationship results to an adverse selection problem.

On the other hand, under the PSC the state shields itself from the risks associated with the exploration activities; thereby allowing the IOC to recover its investment only if oil is discovered. Consequently, the IOC's action ex-ante (investment decisions taken) is rewarded based on the performance of the IOC ex-post which is associated with a number of risks and uncertainties (Gibbons, 2005a). Hence, if the IOC is risk-averse, it will make investment that provides optimal trade-off between risk-taken and expected reward provided under the PSC agreement (Bindemann, 1999). Thus, reward system based on measured performance, which may not capture the specific

[15] The output may be either oil, gas, or a combination of both

relationship between IOC's inputs and outputs, may warrant the IOC to manipulate the input (cost oil); thus the problem of moral hazard (Pongsiri, 2004). It can, therefore, be argued that the IOC, being the sole operator of the venture (PSC), may engage in sub-optimal behaviours (adverse selection and moral hazard) that may enhance its performance.

It can be deduced from the foregoing that the IOC decides on the cause of action to be taken in order to maximise output from the resources of the state. Because ownership of oil reserves plays a vital role in determining pay-off to the parties involved in either JVC or non-JVC, it can be argued that asset ownership is one of the agency problems that characterises upstream operation. Consequently, asset ownership can facilitate the principal-agent contractual relationships (Grossman and Hart, 1986). That is, if an agent does not own the asset, being used in the contract, the agent's incentive comes only from the measured performance. However, if the agent owns the asset, the agent's incentive is not only based on the measured performance but also on the residual value of the asset (Gibbons, 2005a).

In summary, agent performs differently based on its ownership right on asset. Consequently, considering the assumption that agent's ownership right on asset influences the agent's actions ex-ante the state can structure an optimal incentive-system in such a way that will mitigate the potentials for moral hazard and adverse selection problems in JVC or non-JVC.

Discussions so far indicate how the principal-agent relations can be managed in the best possible ways from the theoretical view point. However, there is the need for considering the way and manner the upstream oil and gas sector works, i.e. the way governments control upstream operations. This is an issue discussed in the next section.

2.4 Previous Studies

Discussion on the theoretical framework provides us with the details on how an agency relationship between principal and agent can be managed effectively via an optimal incentive-system. However, where there seem to be some frictions in the relationship between principal and agent, the need for finding solutions cannot be overemphasised. For example, where there is an information asymmetry, the principal opts for adopting some control mechanisms in order to checkmate agency problems.

In the same line of argument of agency theory, government participation in upstream operations can be attributed to such frictions in the agency relationship between the oil-rich nations and the IOCs. As mentioned earlier on, one major factor causing such frictions is attributed to lack of goal congruence between the oil-rich nations and the IOCs (Bindemann, 1999). Therefore, there is the need for governments to take control of the sector where such frictions result in less profit and oil revenue to the IOCs and governments respectively. Discussion on the historical background on government control in upstream operations is provided hereunder.

2.4.1 Reasons for Government Control in Upstream Operations

As mentioned in section 2.1 above, oil-rich nations rely on the expertise and funding of the IOCs for exploration and development of their oil reserves (Sihotang, 2003). During the period of non-state participation[16], states' role was that of monitoring of the upstream operations alone (Alalade, 2004). Therefore, the IOCs enjoyed the dominance in upstream operations until the 1970s, the aftermath of OPEC oil crisis when the states started participating in the upstream operations for various reasons (Kashani, 2005).

For example, with the establishment of Organisation of the Petroleum Exporting Countries (OPEC), upstream operations changed drastically around the world. Indeed, OPEC membership was one of the major reasons why the oil-rich nations (especially the less-developed countries) started participating in the upstream activities (OPEC, 2008). Other reasons include security for the supply of oil (Kashani, 2005), the need for national sovereignty (Wolf, 2009) and reduction in oil revenue accruable to the oil-rich nations as a result of some manipulations in determining the oil price by the IOCs (Bindemann, 1999). Hence, the economic consequence of states' participation in upstream operations is the trade-off between the oil revenue accruable to the states and profits accruable to the IOCs.

Oil security and the need for national sovereignty are reasons not only found among the less-developed oil-rich nations but also among the developed

[16] Participation and control mean the same in the context of this study. Therefore, they may be used interchangeably.

nations who realised the risks associated with their huge dependence on imported oil. As Winston Churchill stated in July 1913, that

> *"if we cannot get oil we cannot get corn, we cannot get cotton and we cannot get a thousand and one commodities necessary for the preservation of the economic energies of Great Britain"* (cited in Wolf 2009, p. 2642).

With the paradigm shift in upstream operations, states assumed the strategic role in managing their oil resources. The states normally operate under joint ventures with the IOCs or engaging the IOCs in production-sharing or service contract. Similarly, some of the oil-rich nations established their National Oil Companies – NOCs for national interest (Tanzer, 1980).

The need for developing domestic oil capacity and other developmental programs associated with the oil exploration and development also encouraged states to establish their NOCs in the 1970s (Levy, 1982). However, it is argued whether the changing role of states from landlords to entrepreneurs (Klapp, 1982) is really for the national interest considering the challenges associated with the operations of the NOCs (Hann, 1986).

The NOCs face a number of management challenges such as lack of efficiency in operations, conflict of interests between state's and business' needs, and accountability issues (McPherson, 2010). These management challenges resulted in a loss of confidence on the ability of the NOCs to meet-up with the realization of the 'national interests' (Hill and Hellriegel, 1994); an issue that motivated the privatisation of some of the NOCs (Al-Mazeedi, 1992).

Privatization programme is being championed by many countries on the basis of firm efficiency (Villalonga, 2000; Megginson *et al.*, 1994, Megginson and Netter, 2001). For example, Megginson *et al.* (1994) document a strong performance improvement in the post privatization period of state-owned firms. Section 2.4.4.1 below discusses, in detail, the effect of privatization (ownership change) on the performance of state-owned companies.

While some states (the UK for example) privatised their NOCs, others (Nigeria for example) entered into joint operations with the IOCs by modifying the existing concessionary agreements into joint venture agreements that paved way for the establishment of joint venture companies (Hill and Hellriegel, 1994; Hill and Hellriegel, 1994; Jennings *et al.*, 2000). The discussion below focusses on the Nigerian experience.

2.4.1.1 The Nigerian Experience

Oil exploration activities in Africa have been growing steadily since the major oil discoveries in the 1950s. For example an increase of Africa's oil production, to total world out-put, from 3% in 1957 to 9.8% in 1976 was quite phenomenal. The International Oil Companies (IOCs) operating in Africa have been the driving force for such phenomenal growth. This is because the IOCs have the required funds, skills, and technology needed for the capital intensive investment and technologically driven operations in upstream activities (Baker, 1977).

Despite the role of the IOCs in the growth of oil exploration activities in Africa, their influence on the output of oil creates problem between them and their host nations. This is because the IOCs, in most cases, have the leeway to determine oil revenue accruable to their host nations due to their influence on deciding whether to increase or decrease their production level. This problematic situation raises questions on moral hazard and adverse selection issues that normally characterised the relationships between the IOCs and their host nations (Pongsiri, 2004). These problems arise when the host nations try to protect their interest of long-term sustainable development, and on the other hand the IOCs bring to bear the interest of their shareholders that is not the same as that of the host nations.

Baker (1977) argues that the IOCs' decision on determining the production level is highly correlated with the price of crude oil at international market that the IOCs' home nations always try to control. Consequently, the potential for having some agency problems, such as moral hazard and adverse selection problems, between the host nations and the IOCs, need to be carefully addressed in a win-win situation. Efforts by the less-developed oil-rich nations towards addressing such problems created tension between the IOCs and their host nations not only in Africa but around the world. Thus, one of the measures taken towards addressing such problems by the less-developed oil-rich nations was the establishment of Organisation of the Petroleum Exporting Countries (OPEC) in 1960 (OPEC, 2008).

OPEC aims at addressing such problems both at individual country level and collectively among its members. OPEC, therefore, marks the beginning of institutionalising control measures by the less-developed oil-rich nations in order to effectively control their own oil resources that were hitherto dominated by the IOCs.

Consequent upon the establishment of OPEC, host nations started active participation in the upstream activities that were hitherto dominated by the IOCs. In similar development, Nigeria joined OPEC in 1971 and came-up with an oil policy in the same year that paved its way for active participation in the upstream sector. In order to facilitate full participation, the Nigeria National Oil Company (NNOC) was established in 1971. NNOC engages in oil exploration and production activities alongside the upstream oil companies operating in the country (Oromade, 1986). Nigeria's active participation in oil exploration activities resulted to huge inflow of oil revenue that suddenly overshadowed revenue from all other sectors, including the agricultural sector that was the main stay of the Nigerian economy before the discovery of oil (Kejeh, 1986).

Since the discovery of oil in 1956 and the subsequent flow of oil revenue, the oil and gas industry has been playing a vital role in the nation's economy and this is due to its contribution to the nation's foreign exchange of over 90%.

This huge flow of oil revenue makes the Nigerian economy largely dependent on oil revenue (Ariweriokuma, 2009). Thus, the flow of revenue to the Nigerian Government largely depends on the performance of the oil and gas industry. Consequently, there is the need to ensure effective and efficient operations of the industry if Government is to sustain its flow of revenue from oil.

In order to ensure effective and efficient operations of the oil and gas industry Government needs to control the activities of the industry. Therefore, a Hydrocarbon section in the Ministry of Lagos Affairs was established in 1950. The Section was saddled with the responsibility for controlling the affairs of the industry. Thereafter, the section became a division under the Ministry of Mines and Steel in 1970, and subsequently became a Department of Petroleum Resources (DPR) in the same year. The Department became under a full-fledge Ministry of Petroleum Resources in 1975. The Ministry is responsible for initiating policies and guidelines for the Nigerian oil and gas industry (DPR, 2012).

DPR, as a Department in the Ministry, has the responsibility for advising government on technical and petroleum policy issues. More so, DPR regulates and monitors the activities of the oil companies operating in Nigeria in order to ensure that the oil companies operate in accordance with the rules, regulations, and Petroleum Laws in Nigeria (Ariweriokuma, 2009). DPR, therefore, serves as the regulator in the Nigerian oil and gas industry.

Another agency under the Ministry of Petroleum Resources that serves as a player in the Nigerian oil and gas industry is the Nigeria National Petroleum Corporation (NNPC). NNPC participates, on-behalf of the Nigerian Government, in the oil exploration activities, exporting and/or importing of crude oil, processing of crude oil, and sales of the refined oil and/or gas. NNPC is a player because its subsidiaries such as the Nigeria Petroleum Development Company (NPDC) and the National Petroleum Investment Management Services (NAPIMS), Nigerian Gas Company (NGC), engage in the up-stream activities alongside other upstream oil companies.

NNPC, therefore, controls Government investment in the upstream sector with a view to enhancing the flow of oil revenue to the Government. NAPIMS being the investment manager of the NNPC manages such investment in the upstream sector (NEITI, 2011b). The upstream companies play an important role in the nation's crude oil production, especially the Joint Venture Companies (JVCs). See for example Table below, over 80% of the nation's crude oil is produced by the JVCs. This indicates the strategic role of the JVCs in the Nigerian oil and gas industry; therefore the aforementioned Ministry, Departments and Agencies (MDAs) adopt a number of control mechanisms in order to ensure effective and efficient operations of the upstream oil and gas companies.

Therefore, NNPC enters into joint venture agreements with some of the IOCs that were operating under the concessionary agreements since 1937

(Oremade, 1986). Under such agreements, joint venture companies were established, with the NNPC holding the majority equity of 55-60% in all the JVCs but serving as a non-operator partner; while the IOCs serve as operators of the various JVCs. This indicates that equity ownership serves as a control determinant in the operations of the JVCs. More so, the JVCs operate alongside other IOCs that operate under PSCs and SC. To this end, the major research question of the study is ***to what extent government control affects the performance of upstream oil and gas companies in Nigeria***?

Consequently, the next section focuses on findings of previous studies on the effect of government control on companies' performance. First of all, such studies are synthesised on an industry-wide perspective and then concludes with the section specifically focusing on the upstream oil and gas sector.

2.4.2 Effect of Government Control on Companies' Performance

This section reviews literature on the effect of government control on the performance of companies. Factors influencing companies' performance include companies' objectives, ownership type, government regulation, and competition among others (Pestieau, 2006). Although government regulation and ownership are not the only factors influencing the performance of companies, this study focuses only on the effect of both government regulation and ownership on the performance of upstream oil and gas companies in Nigeria. Hence, this section is divided into two main sections: regulatory effect and ownership effect, which are discussed in sub-sections 2.4.3 and 2.4.4 respectively.

2.4.3 Regulatory Effect

2.4.3.1 Regulatory Environment

First of all, there is the need for us to discuss what constitutes regulatory environment. Generally, regulation creates and/or limits responsibilities amongst individuals, firms or nations (Levi-Faur, 2010). As a result, regulation can be in different forms such as legal, contractual, or market regulation (ibid.). For example, market regulation refers to the determination of production decisions, quantity of output to be sold, and prices of such output in order to address the 'profiteering' tendency of the regulated firms (Pestieau, 2006).

Hence, market regulation is considered as the product of government policy on a particular issue that is of significant importance to the general public. For instance, where government believes that prices charged by a particular company are too high to the extent that the public are disadvantaged, then government may step-in in order to regulate such prices. From the foregoing, it can be deduced that there is a trade-off between 'confiscating' profit of the regulated firms and ensuring the attainment of public interest. This, therefore, forms the basis of debate in business regulation literature (Burns *et al.*, 1998).

Hence, the regulatory environment consists of regulated firms' and regulators' information structures, regulatory constraints, and regulatory instruments and incentive schemes (Laffont and Tirole, 1993). While the regulator may opt for moderate regulatory system that is of benefit to both the regulated firms and the general public, there may be some constraints that limit such regulatory effort. These regulatory constraints are discussed here under.

2.4.3.2 Regulatory Constraints

Regulatory constraints prevent the regulator from realising set policy, these constraints include informational, transactional, and administrative and political (Laffont and Tirole, 1993).

Information Constraints

The informational constraint refers to information asymmetry which limits the ability of the regulator to be effective in its regulatory function. Informational constraint can be in form of either moral hazard or adverse selection, as explained in section 2.3.2 above under agency problem.

The moral hazard aspect of the informational constraint happens because of the advantage taken by the regulated firm from the endogenous factors that are not observable by the regulator (ibid.). In this instance, the regulated firm carefully selects its action which in turn influences its costs. In essence, the amount of effort exerts on such action is what underscores the moral hazard problem in a principal-agent relationship.

In the upstream sector, for example, timing of exploration, development, and production activities may be associated with 'negative' effort on the side of the regulated firms (the upstream oil and gas companies), which the regulator may have little influence because of the fact that the upstream oil and gas companies possess the knowledge about the geological and geophysical nature of the oil fields more than the regulator. Similarly, the adverse selection problem arises when the regulated firm is better informed about some exogenous variables than the regulator (ibid.).

Considering the adverse-selection problem in the upstream sector, for example, the problem of adverse selection is associated with the adoption and usage of either appropriate or inappropriate technology in the production of oil and/or flaring of gas respectively. The argument here is that upstream oil and gas companies are better informed about the cost of either producing gas or the 'benefit' of flaring it. A case in point is the problem of gas flaring in Nigeria (Hassan, 2012). Although there is a penalty for flaring gas in Nigeria (ibid.), the question here is whether or not such penalty mitigates gas flaring in Nigeria[17].

[17] This question is not within the focus of this study, but an issue that requires an in-depth investigation due to its importance and economic implication on the Nigerian economy.

In a nutshell, the concomitant effect of moral hazard and adverse selection problems is the loss of control by the regulator.

Transaction Constraints

Transaction constraints are associated with incomplete contracts. Contract is incomplete when future contingencies are not comprehensively captured in the contract (Williamson, 1975). For instance, where the contingencies about contract are difficult (or even impossible) to be foreseen, then transaction costs are likely to be higher than where the contingencies are relatively captured (ibid.). Hence, the less comprehensive a contract is the higher the transaction costs that may be incurred.

Transaction costs are normally higher in the upstream sector because of the distinctive nature of operations in the industry, such as the long-term nature of investment, uncertainties associated with the discovery of oil, and its commercial viability if discovered (Wright and Gallun, 2005). Thus, these distinctive features of the industry make contracting, in the upstream sector, incomplete; which may add to the transaction costs in the oil exploration contracts.

In determining the appropriate transaction costs, Grossman and Hart (1986) assert the importance of a good incentive-system regarding asset ownership. Similarly, Laffont and Tirole (1993, p. 4) state that:

> *"the contingencies that are left out of the incomplete contract must be filled in. The authority relationship induced by the ownership of assets defines the status quo for renegotiation about what is to be done when the unforeseen contingency occurs".*

Hence, there is the need for the oil-rich nations to adopt an optimal incentive-system in order to mitigate the effect of transaction constraints in their contractual relationships with the IOCs. In this regard, the alternative funding arrangement in the JVCs may serve as such an instrument with which the constraints associated with the funding of the upstream operations can be mitigated. Hence, the research questions 1-3 and their related hypotheses 1-3 are aimed at addressing this issue.

Administrative and Political Constraints

Administrative and political constraints are caused by some legislative acts, rules, and regulations defining and/or limiting the regulator's responsibilities (Laffont and Tirole, 1993). The constraints may be caused due to some limitations in the scope of regulation, or the regulatory instruments available to be used by the regulator, or the time horizon over which the regulation covers, or the procedural requirements (ibid.).

For instance, the regulator may be constrained on the instruments to use, especially by formulating their own regulations and following such objectively without undue influence from the political class. Procedural requirements, on the other hand, can be very complex due to duplication of functions. In the Nigerian context, for example, procedural constraints have been causing undue delay in carrying out some regulatory functions and the resultant loss of government revenue from the oil industry (Ribadu, 2012).

A case in point is the power tussle between the legislature and the executive arms of government that results in ineffective regulatory functions on the one hand and inefficient upstream operations on the other (Ariweriokuma, 2009). This buttresses Laffont and Tirole's (1993, p. 5) argument that administrative and political constraints "are not exogenous but are driven by informational and transactional constraints" because "regulators themselves are agents for other parties". Hence, regulators need to be incentivised to carry-out their duties as assigned to them by their 'political principals'.

In other words, in the upstream sector, for example, the regulator's capacity needs to be developed in order to properly develop the sector so as to sustain the performance of the sector. For instance, using institutional quality and political competitiveness as the measure of performance of the upstream sector of the oil-rich nations, the performance of the upstream sector in Nigeria is ranked poor due to frequent disruption to production, limited development of domestic companies with operational capacities, administrative red tape that imposes additional costs, and failure to develop natural gas resources to potential (Thurber *et al.,* 2011).

The aforementioned problems are associated with Nigeria's weak bureaucracy which inhibits the regulatory system. This problem may be addressed by appropriate separation of functions within the upstream sector.

To this end, Thurber *et al.* (2011) argue that a country's ability to implement separation of functions depends on institutional development of that country.

A case in point is the tripartite systems (policy, regulation, and commercial functions) in the upstream sectors of both Nigeria and Norway. While Norway's system works effectively, Nigeria's system does not work well. This, as described by Thurber *et al.* (2011, p. 5375), is perhaps attributed to the nature of the upstream sector in Nigeria where "regulators acted as either pernicious micromanagers (at policy level) or mostly passive rubber stamps (at regulation level), or both". Hence, government lacks the capacity to check-mate the activities of the sector effectively, which results to "government bodies exert no truly effective authority over the activities of the international companies that extract the country's oil".

Thurber *et al.* (2010) stated that the complexities of upstream sector in Nigeria results in ineffective regulatory system and inefficient operation of the sector. This, for example can be deduced from the confused role of the Nigerian National Petroleum Corporation (NNPC); as succinctly stated by Thurber *et al.* (2010, p. 5):

> *Despite its formal organization as a vertically-integrated oil company, NNPC is neither a real commercial entity nor a meaningful oil operator. It lacks control over the revenue it generates and thus is unable to set its own strategy. It relies on other firms to perform essentially all of the most complex functions that are hallmarks of operating oil companies. Yet unlike some NOCs it also fails to fit the profile of a government agency: Its portfolio of activities is too diverse, incoherent, and beyond the reach of government control for it to function as a government policymaking instrument.*

In summary, clear separation of functions amongst various institutions in the upstream sector is at the core of the multilayered agency relationship described above, i.e. general public vs. politicians, politicians vs. regulators, and regulators vs. regulated firms. In essence, such separation of functions which enhances regulatory functions in a regulated market is lacking in the Nigerian context.

On the other hand, government may opt for having substantive control of the regulated firms by owning a stake in the firms. This brings us to the core issue of ownership effect on companies' performance, i.e. the relationship between government stake-holding and companies' performance, an issue discussed hereunder.

2.4.4 Ownership Effect

Literature on the effect of ownership on companies' performance is classified into three strands; the first strand investigates ownership effect based on private or public ownership (Pestieau, 2006). The second strand of the literature focuses on the effect of change of ownership via privatisation of the hitherto state-owned companies (see for example Cragg and Dyck, 1997; Cragg and Dyck, 1997; Cragg and Dyck, 1998; Villalonga, 2000; Al-Mazeedi, 1992; Boubakri and Cosset, 1998; Kang, 2009; Okten and Arin, 2006; Ramirez, 1998; Wei *et al.*, 2003). Lastly, the effect of joint ownership on the performance of companies forms the third strand of the literature (Boateng and Glaister, 2002). To this end, empirical findings on these three strands of the literature are presented hereunder.

First of all, Pestieau and Tulkens (1993) state that when comparing the performance of public and private companies, it is essential to establish whether or not both the organisational and market settings are kept constant. Pestieau and Tulkens (1993) classifications of these settings are presented in Table 3 below with the exception of joint venture, which is added by the researcher in order to address questions specifically related to this study. This is because the Nigerian government engages in joint venture operations with the IOCs that are engaged in the upstream activities, which results in mixed-ownership in the upstream oil and gas companies. The mixed-ownership used in the context of this study refers to stake-holding (ownership) of both government and private companies in joint venture companies.

Table 3: Ownership Structure vs. Alternative Competitive and Regulatory Settings

Ownership structure	No competition		Competition
	No regulation	**Regulation**	
Public	Pure public monopoly	Autonomous public monopoly	**Public firm in competitive setting**
Private	Pure private monopoly	Regulated private monopoly	**Private competitive firm**
Joint Venture	**Pure joint venture monopoly**	**Regulated joint venture monopoly**	**Joint venture in competitive setting**

Adapted and modified from: (Pestieau and Tulkens, 1993, p. 352)

Therefore, this study classifies firms according to organisational and market settings into nine, instead of six by Pestieau and Tulkens (1993). Findings of previous studies on the effect of ownership structure of companies on their performance are presented hereunder.

As Pestieau and Tulkens (1993, p. 352) state "... expert opinion would rank competitive private firms as the most efficient ... and noncompetitive firms as least efficient". Hence, this study focuses on the effect of ownership and regulation on *regulated private monopoly and regulated joint venture monopoly*[18]. Government ownership and regulation are the two important aspects of government control considered in the context of this study.

The empirical literature comparing efficiency differential between private and state-owned is presented, as synthesised by Villalonga (2000, p. 47-49), in

[18] Regulated private monopoly here are the production-sharing and service companies, and the regulated joint venture monopoly here are the joint venture companies.

Table 4 below. However, it is worth noting that the empirical literature on part (c), petroleum industry which is the focus of this study, is synthesised by the researcher.

Hence, ownership effect is examined based on the cross-sectional nature of companies, i.e. private, state-owned, or joint venture, and longitudinal effect of ownership change over a period of time (privatisation).

Table 4: Empirical Studies on the Effect of Ownership on Companies' Performance

Industry	State-owned more efficient	No significant difference	Private more efficient
Based on efficiency frontiers method (like Data Envelopment Analysis and Stochastic Frontier models)			
Electricity	Färe *et al.* (1985), US; Côte (1989) US; Pollit (1994, 1995), US and UK*	Hjalmarsson and Veiderpass (1991), Sweden	
Airlines		Barla and Perelman (1991), US and Europe	
Refuse collection		Ditexhe (1993), Belgium	Cubbin *et al.* (1987); Burgat and Jeanrenaud (1990), Switzerland
Railways		Filippini and Maggi (1991), Switzerland	Oum and Yu (1991), Canada
Financial		Tulkens (1993), Belgium	
Insurance	Fecher *et al.* (1993), France		
Healthcare	Grosskopf and Vladamis (1987), US		Wilson and Jadlow (1982), US
Education			Rhodes and Southwick (1988), US
Petroleum			Al-Obaidan and Scully (1991), International
Sugar			Ferrantino and Ferrier (1991), India
Various			Boussofiane *et al.* (1997), UK; Argimón *et al.* (1997), Spain*
Based on traditional methods (like econometric models)			
Electricity	Meyer (1975), US; {D[b], BPS,M,BB,B,Y,VY,BV,PM}; Neuberg (1977), US; {M,B,Y[c],BV,PM}; Primeaux	Shepherd (1966), US {D,BV}; Mann (1970), US {D,BV}; Yunker (1975), US {M,BB,B,Y,BV,PM};	Moore (1970)[d], US {D,BPS,B,BV,MP}; Wallace and Junk (1970), US {BPS,PM}; Peltzman (1971),

Industry	State-owned more efficient	No significant difference	Private more efficient
	(1977), US {M}; Pescatrice and Trapani (1980), US {PM}	Spann (1977), US {BPS,BV}; Edison Electric Institute (1985), US {VY}; Atkinson and Halvorsen (1986), US {PM}; Di Lorenzo and Robinson (1982), US {PM}; Holmes (1990), Europe {PM}	US {D,MP,B,Y,VY,BV,PM}; Tilton (1973), US {D,BV}; De Alessi (1974, 1975, 1977), US {M,B[e],Y,VY,BV,PM}; Foreman-Peck and Waterson (1985), US; {PM}
Airlines		Forsyth and Hocking (1980), Australia; {MP,BB,DP,BV,PM}; Morrison (1981), Australia {BV}; Jordan (1982), US and Australia; {BB,DP,BV}; Millward and Parker (1983), Australia {DP}; Ashworth and Forsyth (1984), International {PM}	Davies (1971, 1977), Australia; {D,BPS,M,BB,B,DP,Y,BV,PM}; Mackay (1979), Australia {DP,VB}; Pryke (1982), UK {Y,VY,VB}; Findley and Forsyth (1984), Australia {VB}; Kirby and Albon (1985), Australia {DP}; Kirby (1986), Australia {DP,VB}; Forsyth *et al.* (1986) {VY,VB,PM}; Gillen *et al.* (1989), Canada {VB}; Windle (1991), US and Europe {PM}; Ehrlich *et al.* (1994), International
Refuse collection	Pier *et al.* (1974), US; {BPS,M,Y,BV}	Hirsch (1965)[f], US {D,BPS,MP,Y,BV}; Spann (1974), US {Y}; Feller and Menzel (1976), US {B}; Kemper and Quigley (1976), US {BPS,BV}; Savas (1977a), US {D[g]M,B}; Audit	Savas (1974, 1977b,c,d, 1980), US; {D,BPS[h],M,B,Y,VY,BV}; Kitchen (1976), Canada; {BPS,M,B,Y,VY,BV}; Pommerehne (1976), Switzerland {BPS}; Pommerehne and Frey

Industry	State-owned more efficient	No significant difference	Private more efficient
		Commission (1984), UK {VY}	(1977), Switzerland; {M,B,Y,BV}; Stevens (1978), US {BPS,MP,VY,BV}; Stevens and Savas (1978), US {BPS}; Bennett and Johnson (1979, 1980) US {D,M}; Boorsma (1982), Netherlands {VB}; Hartley and Huby (1985), UK {VY}; McDavid (1985), Canada {VB}; Lawarrée (1986), Belgium {VB}
Water supply	Mann and Mikesell (1971), US; {BPS[i],B,Y,BV,PM}; Bruggink (1982), US {Y,VY,BV,PM}	Feigenbaum and Teeples (1983) {Y,BV,PM}	Hausman (1976), US {BV}; Morgan (1977), US {BPS,BV}; Crain and Zardkoohi (1978, 1980), US; {D,BPS,M,B,Y,VY,BV,PM}; Boland (1983), US {VB}; Lynk (1993), UK {PM}
Railways		Caves and Christensen (1980), Canada; {BPS,M,BB,B,YBV,PM}; Caves et al. (1982) US and Canada {BV}; Freeman et al. (1985), Canada {VB}	
Urban transportation			Oelert (1976), Germany {BPS,PM}; Pashigian (1976), US {D,MP,BB,Y,BV}; Bails (1979) {VB}; Pucher (1982) {VB}; Palmer *et al.* (1983), Canada {BB,BV,PM}; Pucher

Industry	State-owned more efficient	No significant difference	Private more efficient
			et al. (1983) {VB}; McGuire and Van Cott (1984), US {BV}; Wallis (1985) {VB}; Perry and Babitsky (1986) {VB}
Construction			Schneider and Schuppener (1971), Germany {BPS} Rechnungshof Rheinland-Pfalz (1972), Germany {BPS}; Muth (1973), US {BPS}
Telecom	Denny *et al.* (1983), Canada {BB}	Gordon (1981), Canada {BB}; Duch (1991), International {PM}	Foreman-Peck (1985), International {PM}
Financial		Lewin (1982), Europe {BV}	Davies (1981), Australia {BPS,BV,PM}; Davies and Brucato (1987) {VB}
Insurance		Finsinger (1981, 1984[j]), Germany {BPS,Y,BV,PM[k]}	Frech (1976, 1979, 1980) {BPS,Y,BV}; Kennedy and Mehr (1977), Canada {BPS}; Hsaio (1978) {VB}
Healthcare		Becker and Sloan (1985) {BV}; Renn *et al.* (1985) {BV}	Clarkson (1972), US; {D,BPS,MP,BV,PM}; Hrebiniak and Alutto (1973) {VB}; Lindsay (1975, 1976), US {D,BPS[l],BV}; Bishop (1980) {BV}; Frech and Ginsburg (1981), US {BV}; Schlesinger and Dorwart (1984), US {BV}; Schulz *et al.* (1984) {VB}; Frech (1985), US {VB}
Cleaning			Hamburger Senat (1974),

Industry	State-owned more efficient	No significant difference	Private more efficient
services			Germany {BPS}; Bundesrechnungshop (1972), Germany {BPS}; Fischermenshausen (1975), Germany {BPS}
Timber			Bundesregierung Deutscheland (1976a, b), Germany {BPS}; Pfister (1976), Germany {BPS}
Various (cross-industry comparison)	Millward (1990, 1991), UK and US {PM}; Pryke (1971), UK {PM}; Molyneux and Thompson (1987), UK {PM}		Ahlbrandt (1973, 1974), US; {BPS,MP,Y,BV}; Pausch (1976), Germany {BPS}; Funkhouser and MacAvoy (1979), Indonesia {MP,BV,PM}; Bennett and Johnson (1980), US {BPS}; Kim (1981), Tanzania {BV,PM}; Pryke (1981, 1982) UK {Y,VY,VB,PM}; Boardman and Vining (1989), non-US {VB,PM}; Picot and Kaulmann (1989), non-US {VB,PM}; Vining and Boardman (1992), Canada {PM}; Bhaskar and Khan (1995), Bangladesh {PM}; Enderwick (1994), Latin America, Asia {PM}; Adhikari and Kirkpatrick (1990), {PM}; Hamilton (1971), UK {PM}; Gantt and Dutto (1968), Less Developed Countries {PM};

Industry	State-owned more efficient	No significant difference	Private more efficient
			Monsen and Walters (1983), Europe {PM}; Plane (1992), International {PM}
Petroleum			
		Alalade (2004)	Al-Obaidan and Scully (1991); Al-Mazeedi (1992); Victor (2007); Hartley and Medlock (2008); Wolf and Pollitt (2008); Wolf (2009); Eller *et al.* (2011)

[a] (*) Not included in Villalonga (2000); D=De Alessi (1980); BPS=Borcherding *et al.* (1982); M=Millward (1982); MP=Millward and Parker (1983), not included in M; BB=Borins and Boothman (1985); B=Boyd (1986); DP=Domberger and Piggott (1986); Y=Yarrow (1986); VY=Vickers and Yarrow (1988); BV=Boadman and Vinning (1989); VB=Vining and Boardman (1992), not included in BV; PM=Martin and Parker (1997). Note: Millward (1982) is included and extended in Millward and Parker (1983). So is Boardman and Vining (1989) in Vining and Boadman (1992).

[b] Classified as neutral by De Alessi.

[c] Classified as neutral by Yarrow.

[d] Classified as neutral by Boyd and, Martin and Parker.

[e] Boyd classifies De Alessi (1975) as neutral or as favourable to state ownership, depending on the measurement employed.

[f] Classified as favourable to private ownership by De Alessi and Yarrow; as favourable to state ownership by Millward and Parker.

[g] Classified as favourable to private ownership by De Alassi.

[h] Classified as neutral by Borcherding *et al.*

[I] Classified as favourable to private ownership by Borcherding *et al.*

[j] Classified as favourable to private ownership by Vining and Boardman; as favourable to state by Yarrow.

[k] Classified as favourable to private ownership by Martin and Parker.

[l] Classified as favourable to private ownership by Borcherding *et al.*

2.4.4.1 Private Ownership Effect

Effect of private ownership on companies' performance is well-researched and a number of studies established a positive correlation between private ownership and companies' performance. The proponents of this view argue that, *ceteris paribus*, private firms are inherently more efficient than the state-owned enterprises (see for example Alchain, 1965; Tulkens, 1976; De Alasi, 1974; Stiglitz, 2007).

Looking at the issue from the property rights theory perspective, Alchain (1965) argues that lack of diffusion in ownership in the public enterprises and the lack of incentive for the public to monitor the management of such enterprises make the public enterprises inherently less efficient than their private counterparts.

In the same line of reasoning as Alchain (1965), De Alesi (1974) argues that state-owned enterprises are less affected by market forces because they are protected by government 'subsidies' that conceals their inefficiencies. Some of the previous studies buttressing this view are presented in Table 5 above.

2.4.4.2 State Ownership Effect

The question of efficiency differentials between the private companies and state-owned enterprises is typically an empirical issue. Hence, depending on specific cases, private and public firms may perform differently under different circumstances that are otherwise not favourable for them (Dewenter and Malatesta, 2001). However, Dewenter and Malatesta assert that state-owned enterprises are less profitable than privately-owned companies. This is largely because state-owned enterprises tend to be more levered and labour-intensive than their private counterparts.

Similarly, Boycko *et al.* (1996) states that inefficiency in state-owned enterprises is caused by politicians who influence the business' decision makers to employ more labour than needed. Hence, it can be argued that the agency problem, which results in inefficient operations, lies with the politicians rather than the managers of publicly-owned companies. Therefore, privatising such companies help to restructure the companies and mitigate such X-inefficiency[19].

Asserting Boycko *et al.*'s (1996) view, Krueger (1990) states that the labour employed at the instance of such political influence tends to be below the standard requirements for their respective positions. Hence, the question as to what extent political influence affects the performance of the publically-owned companies? However, this question is beyond the scope of this study, because the companies that are being studied are jointly-owned on one hand and privately-owned on the other hand, not publicly-owned.

[19] In economic theory, x-inefficiency assumes that the management of firms act to maximise profit by minimising the inputs used to produce a given level of output. In this case, it only looks at the outputs that are produced with given inputs. It does not take account of whether the inputs are the best ones to be using, or whether the outputs are the best ones to be producing (Leibenstein, 1966). This is especially the case in the case of Nigerian oil and gas industry where the upstream oil and gas companies engage in gas flaring activities (Hassan and Kouhy, 2014) that is not only detrimental to the environment but also reduces the oil revenue accruable to the government.

2.4.4.3 Ownership Change Effect

Empirical literature indicates that privatisation has a significant positive effect on companies' financial and operating efficiency (Kireri and Nellis, 2002). Findings on the effect of ownership change on the performance of companies indicate that state-owned firms in both developed (Megginson *et al.,* 1994) and developing (Boubakari and Cosset, 1998) countries perform significantly better after privatisation. These findings indicate that after the state-owned enterprises have been privatised profitability gets higher, operations are more efficient, output is higher, capital investment is higher, employment level increased, dividend payment increased, and leverage declined.

On the balance of differing views presented above, another strand of literature argues that ownership has no significant effect on companies' performance. As Hicks (1935, p. 8) argues that monopoly managers "are likely to exploit their advantage much more by not bothering to get very near the position of maximum profit, than by storming themselves to get very close to it"[20]. Affirming Hick's (1935) view, Leibenstein (1966) argues that companies operating in the pure monopoly market (private or public) are likely to be X-inefficient.

Hence, the main argument here is that efficiency comparison between private and public is most suitable where both companies operate under the

[20] (Hicks 1935) quoted by Pestieau and Tulkens (1993:352)

same competitive or regulatory environment. Hence, this study compares regulated private monopoly and regulated joint venture monopoly (see Table 4 above). Findings of the previous studies indicating less significance of ownership are presented in Table 4 above. Having reviewed literature on industry-wide basis, the next section focuses exclusively on the oil and gas industry findings, which constitute the focus of this study.

2.4.4.4 Ownership Effect in the Oil and Gas Industry

Contrary to the extensive literature on the effect of ownership on companies' performance in various industries as presented in parts A and B of Table 4 above, part C of the Table indicates very few studies (Al-Obaidan and Scully, 1991; Al-Mazeedi, 1992; Alalade, 2004; Victor, 2007; Hartley and Medlock, 2008; Wolf and Pollitt, 2008; Wolf, 2009; Eller *et al.,* 2011) that investigated ownership effect on the performance of oil and gas companies.

It is worth noting that investigating ownership effect in the oil and gas industry mitigates some of the conceptual issues that are attributable to other sectors, like sector specific effects, which are "automatically controlled for... (and which) rules out important sources of ownership endogeneity" in the oil and gas industry (Wolf 2009, p. 2643). Findings of the studies conducted specifically on oil and gas industry are discussed here under.

The first study conducted on ownership effect in the oil and gas industry is that of Al-Obaidan and Scully's (1991). Using deterministic and stochastic methods, Al-Obaidan and Scully investigated the efficiency of 44 oil and gas companies using a cross-sectional analysis with a 1979-1982 dataset. Input-output relationship was investigated by using assets as inputs and revenue earned as output on one hand, and number of employees as inputs and quantity of crude oil produced as output on the other hand.

Their findings indicate that while scale efficiency seems to be the same between state-owned and private oil companies, technical efficiency is 35% lower in state-owned oil companies. Some of the limitations of their study include the following. Firstly, the input-output variables are highly aggregated. For example, the use of total revenue as an output variable may be flawed considering the differences in taxes across countries. This limitation will be addressed in this study by considering not only the revenue figures but also the actual output produced.

Secondly, the definition of control variables such as integration and multinationality ratios are very 'crude'; an issue acknowledged by Wolf and Pollitt (2008). Nonetheless, their seminal work is very important being the first empirical work in the oil and gas industry that specifically examined performance differentials between private and state-owned oil and gas companies.

Although this study is similar to Al-Obaidan and Scully's (1991) in investigating ownership effect on the performance of oil and gas companies, it differs from theirs based on the methodology adopted. While Al-Obaidan and Scully (1991) adopted a cross-sectional data analysis this study uses a panel data analysis; as panel data provides a more comprehensive picture of the performance differentials based on different ownership status over a period of time (Wolf, 2009).

Another important difference between this study and that of Al-Obaidan and Scully's (1991) is the focus of analysis. While Al-Obaidan and Scully (1991) excluded companies that are not vertically integrated[21] from their analysis, such companies are the subject of this study. Al-Obaidan and Scully argue that the efficiency of companies that engage in upstream activities is mainly determined by geographical factors rather than the ownership structures of the companies.

Acknowledging the differences in geographical factors across countries which makes Al-Obaidan and Scully's (1991) argument relatively valid in the context of their work, this study argues that investigating the effect of ownership structure may be more appropriate in determining performance differentials of the upstream oil and gas companies operating in Nigeria; considering the fact that geographical factors affecting the operations of these companies are relatively similar in Nigeria.

[21] These are upstream oil companies that engage only in exploration, development, and production of crude oil, without engaging in any refining activity. It is important to note here that this is one of the control variables that this study considers as one of the limitations of their work.

Similarly, Al-Mazeedi (1992) argued that the private oil companies may be more efficient than their state-owned[22] counterparts because the strength of the private oil companies lies not only in their financial assets but also their managerial and technical expertise that is based on merit, and their cutting-edge technology that is an output of their continuous research and development. On the other hand, the state-owned oil companies may be less efficient due to the tendency of pursuing political rather than commercial objectives, absence of stock market control mechanisms, and lack of managerial and technical expertise.

Hence, Al-Mazeedi argues that if the state-owned oil companies in the Persian Golf were to be privatised the benefits accruable will not only make the companies more efficient but the oil and gas industry in the region will embark on the transformation to growth and prosperity. Consequently, the security of oil supply will be enhanced, which will in turn foster a harmonious relationship between the oil exporting and importing nations.

Although this may be considered as an indirect benefit of privatising the state-owned oil companies, Al-Mazeedi opined that the efficiency of the companies will be greatly enhanced due to inflow of foreign managerial expertise and technical know-how, and the inflow of foreign funds that will

[22] State-owned and NOCs are used interchangeably

facilitate the downstream integration. Thus, this study differs from Al-Mazeedi's because it aims to empirically compare performance differentials between the jointly-owned and privately-owned oil companies, rather than the effect of ownership change, from state to private, on companies' performance, as was the hallmark of Al-Mazeedi's analysis that may be considered too anecdotal for performance differential analysis between jointly-owned and privately-owned oil companies.

Alalade (2004) conducted the first empirical study on financial performance measures of the upstream oil and gas companies operating in Nigeria, using the actual data[23] on cost of operation from the oil and gas companies not projected data; as before "there has not been any other such research on Nigeria, based on actual figures" due to sensitive nature of the data and opaqueness of the Nigerian oil and gas industry (Alalade, 2004, p. 132).

Using a financial regression modeling on a dataset of upstream oil and gas companies, Alalade (2004) investigated the effect of government control mechanisms used on unit cost of production and gross margin of upstream oil and gas companies operating under either a JVC or PSC. These control mechanisms include the fiscal instruments (royalty and taxes) and contract type (JVC or PSC).

[23] See methodology chapter for an in-depth analysis on this 'actual data'

Contrary to the findings of other studies (see for example Al-Obaidan and Scully, 1991; Al-Mazeedi, 1992; Victor, 2007; Hartley and Medlock, 2008; Wolf and Pollitt, 2008; Wolf, 2009; Eller *et al.,* 2011) that document efficient operation by the private oil companies, Alalade (2004) documented that the PSCs are not significantly more efficient than the JVCs. Reaffirming Alalade's (2004) view, Adam (2014, p. 288) stated that "... the increasing usage of the PSC arrangement is mainly to overcome the problem of inadequate cash calling (sic), otherwise the JV evidently generates more revenue to government". It is important to note here that the majority stake-holding of government in the JVCs does not make the JVCs state-owned. Therefore, it is not surprising that the findings of Alalade (2004) differ from other studies that examined slightly different type of ownership[24].

This study builds on the contribution made by Alalade (2004), by investigating the effect of government control on the productive efficiency and profitability of the upstream oil and gas companies operating in Nigeria, but using a more robust method of analysis, that is panel data analysis that captures the inherent heterogeneity of the two types of companies, i.e. JVCs and non-JVCs.

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[24] State-owned oil companies differ from the JVCs based on the extent of stake-holding. While the state may hold a majority stake in the JVCs, the state-owned oil companies are owned solely by government.

Similarly, Victor (2007) used Energy Intelligence's Top 100 data for the period 1999-2004 and analysed efficiency differentials between the state-owned and private oil companies. Victor (2007) considered the accumulation of oil reserves and the extraction of such reserves as the non-financial performance measures on the one hand, and revenue per employee and return on assets ratios on the other.

Victor (2007) concluded that state-owned oil companies are less efficient than their private counterparts; she attributes their inefficiencies to the following factors. First of all, despite owning a much higher volume of oil reserves, the state-owned oil companies extract their oil reserves far less efficiently than their private counterparts. Hence, the private oil companies are 'nearly one-third better' at converting oil reserves into output.

Secondly, the state-owned oil companies are less efficient due to excessive government control that does not only limit their ability in converting oil reserves into output but also generates less revenue from their output. This inefficiency, Victor (2007) argues, is associated with factors such as slower depletion policy by states, poor investment strategy adopted by the states, and domestic market obligations regarding employment and subsidies for domestic sales.

This study is similar to Victor's research on investigating performance differentials in terms of productive efficiency and revenue generation, but it differs from Victor's by adopting a more robust panel data analysis than the application of a simple regression analysis, used by Victor (2007), which may not provide robust results.

Further, using a dataset of 28 NOCs, Wolf and Pollitt (2008) investigated the effect of ownership change on the performance of such NOCs. Their findings indicate a significant performance improvement on return on sales by 3.6%, total output by 40%, and capital expenditure by 47% and a decrease in employment intensity by 35%.

However, it is important to note here that such performance improvements occurred in anticipation of ownership change. Hence, "details of residual government ownership... provide little incremental explanatory power for firm performance, except for employment intensity" (Wolf and Pollitt, 2008, p. 2). Therefore, the performance of partially privatised state-owned companies can be enhanced without government necessarily relinquishing its control over the oil companies. This issue is similar to the joint operation arrangements between the state and the private oil companies.

Furthermore, using a panel-data regression analysis covering the period 1987-2006, Wolf (2009) investigated whether there were performance differentials, in terms of output efficiency and profitability, between NOCs and IOCs. Wolf reported systematic performance differentials between NOCs and IOCs, with the NOCs under-performing the IOCs in terms of output efficiency and profitability. This study builds on Wolf's work, i.e. by adopting a panel data analysis to investigate output efficiency and profitability of oil and gas companies operating in Nigeria.

Although the methodology adopted, in this study, is similar to that of Wolf's, the context of analysis differs significantly. While Wolf used an international dataset, this study focuses specifically on the JVCs' and non-JVCs' operation in Nigeria. In essence, this may provide a much more detailed analysis on what obtains in a particular country with relatively similar operational and environmental factors that may have direct effect on the companies' performance.

In order to assess revenue efficiency differentials between the state-owned and private oil companies based on theoretical assumptions developed by Hartley and Medlock (2008), Eller *et al.* (2011) applied both Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA) to a panel of 78 National Oil Companies (NOCs) and International Oil Companies (IOCs) over a period of three years (2002-2004). Findings of their study indicate that government ownership reduces efficiency in terms of revenue per employee and oil reserve. Hence, NOCs are less efficient than the IOCs.

Therefore, Eller *et al.* (2011) argue that inefficiency can be attributed to differences in structural and institutional characteristics of the oil companies which are in line with the companies' objectives. This point affirms the view of Hartley and Medlock (2008) who argued that political influence causes NOCs to pursue non-commercial objectives, such as excessive employment, underinvestment in oil reserves, and focusing more on the present extraction of oil reserves, which ultimately results in inefficient operation of the NOCs.

Another important finding of Eller *et al.* (2011) indicates that inefficiency may be attributed to domestic market obligations (DMOs) on the oil companies that determine the quantity of crude oil sold domestically and the price at which such is to be sold (ibid.). This study is similar to Eller *et al.'s* (2011) with regard to investigating revenue differentials between oil companies having different ownership, with a slight difference on the type of ownership being considered. While Eller *et al.* (2011) considered state-owned vs. privately owned oil companies, this study considers joint ventures vs. non-joint venture companies.

The negative effect of the DMOs on the performance of oil companies revealed by Eller *et al.* (2011) raises an important question in the Nigerian context. In Nigeria, for example, from 1999 up until 2003 (when the alternative funding arrangement was introduced), the price of domestic crude sales was determined by the Government. However, from 2003 up to 2011 the price of domestic crude sales was based on the prevailing market price, see Table 5 below:

Table 5: Price of Domestic Crude Oil Sales: 1999 - 2011

Date	Price $/bbl	Price regime
1999 – 2001	9.5	Fixed price
2002 – July 2003	18	
Aug/Sept 2003	22	
Oct 2003	23	
2004	37	Prevailing market price
2005	54	
2006	64	
2007	73	
2008	98	
2009	62	
2010	80	
2011	111	

Source: (Ribadu, 2012, p. 62)

Considering the variations in the price of domestic crude sales above, an important question to be addressed here is to what extent Government regulation on domestic crude oil price affects the gross margin of the upstream companies?[25].

Also, since the domestic crude sale has a direct implication on the oil revenue accruable to the Government, it will be interesting to address the question as to the extent such Government regulation on domestic crude sales affects government oil revenue?[26]

However, this study differs from Eller *et al.*'s (2011) based on the method of analysis adopted. While Eller *et al.* (2011) applied DEA and SFA on a panel dataset, this study adopts multivariate regression analysis on a panel dataset, the same method used by Wolf (2009). Also, this study differs from that of Eller *et al.'s* (2011) based on the data to be used.

While Eller *et al.* (2011) used input data such as number of employees, oil reserves, and natural gas reserves to determine revenue efficiency, this study adopts all the variables above except oil reserves which is not available (at public domain) on a company-by-company basis in Nigeria. Another important difference between this study and Eller *et al.*'s (2011) is

[25] This is yet another question for future study due to non-availability of complete data on the relevant variables to be examined
[26] Same as 25 above

that this study investigates both revenue efficiency and productive efficiency[27].

2.5 Chapter Summary

Considering the intensive capital investment requirement in the upstream operation and the lack of correlation between the amounts invested and the recoverable reserves, risk-averse behaviour is common among the parties involved in the upstream operations. Risk-averse behaviour by either of the parties involved in the contract is a major source of conflict between the parties (principal and agent).

Other problems in the principal-agent relationship include information asymmetry, restrictions on asset ownership, cost of monitoring performance and performance measurement issues. Against all these odds, an optimal incentive-system induces agents to perform efficiently. Therefore, an oil-rich nation (principal) can use an optimal incentive-system to not only mitigate the effect of agency problems but also motivate the upstream oil companies (agents) to perform efficiently.

The principal-agent theory is employed in the context of this study in order to investigate the effect of government ownership on the performance of upstream oil and gas companies operating in Nigeria under different ownership structure that is the JVCs and non-JVCs. It is hypothesised that

[27] A similar variable used by Wolf (2009)

the upstream companies with government stake-holding (JVCs) will perform significantly better than the upstream companies that are non-JVCs. This is informed by the high-powered incentive-system employed in the JVCs that are considered absent in the non-JVCs. The performance metric to be considered here is the cost efficiency[28] as a proxy for performance.

In line with the Boateng and Glaister's (2002) argument, this study believes that since the oil and gas JVCs in Nigeria were formed because of the perennial funding problems (among other things) that have negative effect on the upstream companies' performance, assessing the performance of the companies based on output efficiency and profitability may provide the most appropriate yardstick to determine how well the objectives of the JVCs are achieved.

However, it must be stressed here that the need for funding was not the only reason why the JVCs were formed. The need for technology transfer was also one of the major reasons for the establishment of the JVCs (Gidado, 1992). Nonetheless, in line with the aim of this study, the study focuses only on the financial indicators (output efficiency and gross margin) and non-financial indicators (exploration and development activities).

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CHAPTER THREE:

INSTITUTIONAL AND REGULATORY FRAMEWORK IN THE NIGERIAN OIL AND GAS INDUSTRY

CHAPTER THREE: INSTITUTIONAL AND REGULATORY FRAMEWORK IN THE NIGERIAN OIL AND GAS INDUSTRY

3.1 Introduction

This chapter discusses the institutional and regulatory framework of the Nigerian oil and gas industry. First of all, section 3.2 presents the historical background on oil exploration in Nigeria; which is followed by a discussion on the institutions that made up the oil and gas industry in section 3.3; and finally section 3.4 discusses the legislations governing the affairs of the industry.

3.2 History of Oil Exploration in Nigeria

Oil exploration activities in Nigeria were pioneered by a German company, the Nigerian Bitumen Corporation, in 1908. These pioneering activities, which ended abruptly in 1914 with the outbreak of the First World War, yielded some 16 shallow boreholes and confirmed a line of oil seepage in Eastern Dahomey Basin in Okitipupa, Ondo State (Oremade, 1986).

After the First World War, oil prospecting efforts resumed in 1937, when Shell Petroleum Development Company was awarded the sole concessionary rights covering the whole Nigeria. Its activities were also disrupted by the Second World War. After the Second World War, oil exploration activities by Shell were resumed in 1947. The renewed efforts of Shell in the exploration activities led to the first commercial discovery in 1956 at Oloibiri, now Bayelsa State (Ariweriokuma, 2009).

Production of oil in commercial quantity commenced in 1958 at 5,000 barrels per day (bpd) and reached 17,000 bpd in 1960 (Oremade, 1986). This discovery of oil in commercial quantity opened up the oil industry in 1961, bringing in other major players like Mobil, Agip, Safrap (Elf), Tenneco and Amoseas (Chevron).

In the 1960s, the aforementioned multinational oil companies, operating under a concessionary arrangement, were the ones bearing the entire risk and cost of exploration, development, and production activities which in turn provided them the title to all crude oil produced. Therefore, the Nigerian government was only entitled to oil rents, royalties and taxes from such operations.

However, today the mode of operation is different. As since Nigeria joined OPEC in 1979, such concessionary arrangements metamorphosed into joint venture operations. Also, since the early 1990s, all the new areas of interest are being governed by the Production Sharing Contract (PSC), which allows NNPC (as the licence holder) to contract with the IOCs who bear the exploration and production risks in return for cost oil and part of profit oil. Furthermore, one service contract exists in the Nigerian upstream oil and gas sector. In a nutshell, the upstream oil and gas sector has experienced substantial changes in the way and manner different companies operate since the establishment of the sector.

3.3 Institutional Framework

This section discusses the structure of the Nigerian oil and gas industry based on the institutions managing the affairs of the industry. Additionally, other stakeholders influencing the activities of the industry are as well discussed. The structure of the industry includes: Government Ministries, Departments and Agencies handling the affairs of the industry such as: NNPC, NAPIMS, NPDC, PPMC, NGC, NLNG[29], and the private sector companies which involve both the multinational oil companies and indigenous companies.

This section is further divided into three sub-sections based on the various stakeholders in the industry; these include the stake-holders, the stake-keepers, and the stake-watchers. This categorisation of the stakeholders into stake-holders, stake-keepers, and stake-watchers is based on Fassin's (2009) 'The Stakeholder Model Refined'. Fassin's (2009) model is found to be the most appropriate model to discuss the roles of various stakeholders in the Nigerian oil and gas industry. Below is the discussion on these various stakeholders.

3.3.1 Stake-holders

Stakeholders are the stakeholders that actively participate in the upstream oil and gas business; these include the NNPC and its subsidiaries, the

[29] Nigerian National Petroleum Corporation (NNPC), National Petroleum Investment Management Services (NAPIMS), Nigeria Petroleum Development Company (NPDC), Pipelines and Product Marketing Company (PPMC), Nigeria Gas Company (NGC), Nigeria Liquefied Natural Gas (NLNG)

multinational oil companies as well as the indigenous oil companies. The aforementioned are the stakeholders that have the real stake in the upstream oil and gas industry. This is because such companies invested their funds and are fully involved in the day-to-day operations of the industry. Discussion on these various stakeholders is provided hereunder.

3.3.1.1 Nigeria National Petroleum Corporation (NNPC)

NNPC is a corporation established by law (owned 100% by the Federal Government of Nigeria) with a responsibility to the Ministry of Energy for participating on behalf of the Nigerian state in the exploration and exploitation of petroleum reserves, and the processing, import/export and sale of the petroleum. The exploration activities of the NNPC are carried out by the National Petroleum Investment Management Services (NAPIMS).

Also, NNPC undertakes commercial operations, in its own right, in the upstream through its subsidiary: the Nigerian Petroleum Development Company (NPDC); and in the downstream through the Pipeline Products and Marketing Company (PPMC) and Nigerian Gas Company (NGC)[30].

3.3.1.1.1 National Petroleum Investment Management Services (NAPIMS)

NAPIMS in the Exploration and Production (E&P) of the Directorate of NNPC is the upstream arm of NNPC that oversees the Government investment in

[30] www.nnpcgroup.com

the Joint Venture Companies (JVCs), Production Sharing Companies (PSCs) and Services Contract Companies (SCs). NAPIMS is, therefore, set up to earn margins arising from investments in the JVCs, PSCs and SCs with the multinationals and also protect the nation's strategic interests in the JVCs.

3.3.1.1.2 Nigeria Petroleum Development Company (NPDC)

NPDC was established in 1988 as a wholly owned subsidiary of the NNPC with responsibility for Petroleum Exploration and Production activities. These activities cover the entire range of the upstream oil and gas business.

NPDC aims to be Nigeria's leading E&P company with significant global presence and applying the best industry practices and technologies in the Nigerian context. The success story recorded by NPDC includes the following:

- Involved in 28 concessions (21 OMLs & 7 OPLs)
- 100% ownership of 5 blocks: OMLs 64, 65, 66, 111 & 119
- 55% equity in 8 blocks: OMLs 4, 26, 30, 34, 38, 40, 41 & 42
- 60% participatory interest in 4 blocks: OMLs 60, 61, 62 & 63
- Varied interest in 7 deep-water concessions
- Non-equity operations in 3 blocks (selected NNPC JV fields)
- 5th largest producer in the country with about 130,000bopd
- Owns & operates the 7th largest FPSO in Nigeria (FPSO Mystras)
- Commenced total delivery of 450 million standard cubic feet wet gas per day (MMSCFD) to the domestic market[31].

[31] http://npdc.nnpcgroup.com/AboutUs/CompanyProfile.aspx

3.3.1.1.3 Nigeria Gas Company (NGC)

The NGC was established in 1988 as one of the 11 subsidiaries of the NNPC. NGC is charged with the responsibility of developing an efficient gas industry to fully serve Nigeria's energy and industrial feedstock needs through an integrated gas pipeline network and also to export natural gas and its derivatives to the West African sub-region. Similarly, NGC is committed to adding value to natural gas and making it an energy resource of first choice for the benefit of different stakeholders[32].

The NGC is charged with the responsibility of developing an efficient gas industry to fully serve Nigeria's energy and industrial feedstock needs through an integrated gas pipeline network and also to export natural gas and its derivatives to the West African Sub-region. NGC gathers, treats, transmit and markets Nigeria's natural gas and its by-products to major industrial and utility gas distribution companies in Nigeria and neighbouring countries[33].

3.3.1.2 Joint Venture Companies (JVCs)

NNPC operates six Joint Ventures (SPDC JV, CNL JV, TEPNG JV, MPNU JV, NAOC JV and POOC JV). The JVs operate according to the Joint Operating Agreement (JOA) governing each and every JV; these include the following:

[32] http://www.nnpcgroup.com/NNPCBusiness/Subsidiaries/NGC.aspx
[33] NEITI (2012)

- One of the JV partners is designated as the operator of the venture (normally the IOCs)
- All parties to the venture share in the cost of operations (agreed annually and financed through cash calls or billing system)
- Each partner lifts and separately disposes its interest share of production subject to the payment of Petroleum Profit Tax (PPT) and Royalty.

3.3.1.3 Production Sharing Contracts (PSCs)

These are the companies that entered into agreements with the NNPC on oil explorations; these companies are normally referred to as the contractors. The Contractors bear all the costs and the risks of development. The produced oil is shared between the NNPC and a particular Contractor to cover Royalty, Production Costs (including capital) and PPT. The remaining profit oil is also shared.

However, it is important to note here that the PSCs do not cover the exploitation of gas, except to state that where gas is discovered in commercial quantities, a separate Gas Development Agreement is to be agreed between NNPC and the respective investors[34].

[34] NEITI (2012)

3.3.1.4 Service Companies (SCs)

The IOCs are paid for the services they rendered. Under this type of contract, the ownership of oil remains with the states and the IOCs bear all the risks associated with their services. In Nigeria, for example, the only SC in operation is Agip Energy and Natural Resources Ltd (AENR).

3.3.1.5 Marginal Field Operators (MFOs)

The IOCs operate in partnership with NNPC under JVCs, PSCs or SC. Others, especially the indigenous oil companies, operate in partnership with international companies under sole risk operations or as independents in a marginal oil field[35]. A marginal oil field is normally an abandoned oil field that is considered unprofitable by the IOCs (Ariweriokuma, 2009).

The following are some of the indigenous companies participating in the upstream oil and gas sector as marginal oil field operators in Nigeria:

- Amni International
- Atlas Petroleum
- Brass Exploration Unlimited
- CAMAC
- Cavendish
- Conoil Producing/ Continental Oil and Gas
- Dubri
- Express Petroleum
- Moni Pulo
- Midwestern Oil & Gas
- Niger Delta Petroleum Resources
- Newcross Petroleum
- Platform Petroleum
- Shebah Exploration and Production Co Ltd
- Waltersmith Petroleum.

[35] http://www.nnpcgroup.com/NNPCBusiness/UpstreamVentures/OilProduction.aspx

3.3.2 Stake-keepers

Stake-keepers are the regulators in the upstream oil and gas sector in Nigeria. Their influence and control on the real stake-holders is far-reaching and monumental on the operations of the industry, because "... they exert a coercive power through laws, norms and codes, and control mechanisms" (Fassin, 2009, p. 123).

It is important to state here that Government is the generic stake-keeper in the Nigerian upstream oil and gas sector. Below are the relevant Government agencies that are saddled with the responsibility of regulating the affairs of the oil and gas industry in general and the upstream oil and gas sector in particular.

3.3.2.1 Ministry of Petroleum Resources (MPR)

The Ministry of Petroleum Resources (MPR) has the mandate to initiate policies for the oil and gas sector and supervise the implementation of approved policies. The Ministry has a technical Department of Petroleum Resources that undertakes the regulation of the oil and gas sector. The Agencies and Parastatals under the supervision of the Ministry also ensure the execution of the approved policies for the sector. The Ministry has four service departments of Planning Research and Statistics, Finance and Accounts, Human Resources Management and Procurement.

The Departments and Agencies are as follows:

- The Department of Petroleum Resources (DPR) – this is the technical department of the Ministry that regulates and monitors activities of the oil and gas industry (see 3.3.2.2 below for details).
- The Nigerian National Petroleum Corporation (NNPC) – this is a parastatal of the Ministry that undertakes the commercial ventures in the petroleum industry on behalf of the Federal Government (see 3.3.1.1 above).
- The Petroleum Training Institute (PTI) – this is a parastatal of the Ministry that undertakes human capacity development for the Nigeria Petroleum industry.
- The Petroleum Technology Development Fund (PTDF) – this is a parastatal which initiates and coordinates programmes aimed at developing petroleum technology in Nigeria.
- The Petroleum Equalization Fund (PEF) – this is a fund that oversees petroleum bridging activities.
- The Nigeria Nuclear Regulatory Authority (NNRA) – this is an agency of ministry that regulates and monitors all activities involving development and use of nuclear tools and radioactive materials.
- The Petroleum Products Pricing and Regulatory Agency (PPRA) – this is an agency of Government responsible for fixing the benchmark prices of petroleum products and regulating and monitoring the transportation and distribution of petroleum products in Nigeria.

- The Nigerian Content Development and Monitoring Board – this is an agency of the Ministry that regulates and monitors the implementation of Nigerian content in all activities of the petroleum industry[36].

3.3.2.2 Department of Petroleum Resources (DPR)

DPR is responsible for the supervision of all petroleum industry operations being carried out under licences and leases in Nigeria; so as to ensure adherence to petroleum policy. This includes processing all applications for licences, monitoring the timeliness and adequacy of all rent and royalty payments and maintaining records on the operations of the industry; particularly those relating to petroleum reserves, technical viability of production and export of crude oil, gas and condensate, licences and leases[37].

Some of the specific functions of the DPR include the following:

- Regulate upstream oil and gas activities
- Conserve Nigeria's oil and gas reserves
- Maximise Government's take in the oil and gas activities
- Ensure compliance with the laid-down health, safety and environmental standards
- Maintain and administer the National Data Repository
- Administer oil and gas acreages and concessions

[36] http://www.nigeria.gov.ng/2012-10-29-11-06-51/executive-branch/104-federal-ministry-of-petroleum-resources/184-ministry-of-petroleum-resources?start=1
[37] www.dprnigeria.com

- Implement Government policies on upstream oil and gas activities[38].

3.3.2.3 Federal Inland Revenue Service Board (FIRS)

Federal Inland Revenue Service (Establishment) Act No. 13 of 2007 formally established the FIRS to control and administer the different taxes and laws specified in the First Schedule or other laws made from time to time by the National Assembly or other regulations made hereunder by the Government of the Federation and to account for all taxes collected[39].

Therefore, the FIRS is responsible for the collection and assessment of, and the accounting for, revenues accruable to the Government from the upstream oil and gas activities.

3.3.2.4 Central Bank of Nigeria (CBN)

The CBN Act of 2007 of the Federal Republic of Nigeria charges the Bank with the overall control and administration of the monetary and financial sector policies of the Federal Government of Nigeria. The main objects of the CBN are as follows:

- To ensure monetary and price stability;
- To issue legal tender currency in Nigeria;
- To maintain external reserves to safeguard the international value of the legal tender currency;
- To promote a sound financial system in Nigeria; and

[38] http://dpr.gov.ng/index/dpr-operations/upstream-regulation/roles-of-dpr-upstream/
[39] http://www.firs.gov.ng/aboutus/Pages/What-FIRS-Does.aspx

- To act as Banker and provide economic and financial advice to the Federal Government[40].

Consequently, CBN keeps all the oil proceeds accruable to the Government.

3.3.2.5 Office of the Accountant General of the Federation (OAGF)

The Office of the Accountant General of the Federation (OAGF) was established under civil services re-organization Decree No. 43 of 1988.

The Office is headed by Accountant-General of the Federation who is the chief accounting officer for the receipts and payments of account of the federation[41].

OAGF is responsible for the overall management of all receipt and payments of the Federal of the Republic of Nigeria; including proceeds from the oil and gas industry. Therefore, the office is responsible for the information on: Domestic Crude Oil Sales proceeds, Petroleum Profit Tax (PPT), Royalty, Signature Bonus, Withholding Tax, Value Added Tax (VAT), Education Tax, Company Income Tax and contributions to NDDC[42]. Other specific functions of the office include the following:

- Supervision of the accounts of Federal Ministries and Extra-Ministerial department;

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[40] http://www.cenbank.org/AboutCBN/
[41] http://oagf.gov.ng/about-us/
[42] www.oagfnig.org

- Collate, present and publish statutory financial statements of account required by the Minister of finance;
- Manage federal Government Investments;
- Maintain and operate the federation account;
- Maintain and operate the accounts of the Consolidated Revenue Fund, Department Fund, Contingencies Fund and other public funds and provides cash backing for the operation of the federal Government;
- Conduct routine and in-depth inspection of the books of accounts of Federal Ministries and Extra-Ministerial Department to ensure compliance with rules, regulations, policies, and Internal Audit Guides;
- Investigates cases of fraud, loss of funds, assets and store items and other financial malpractices in Ministries/Extra-Ministerial department;
- Provides financial regulations and issues Treasury Circulars to Federal Ministries/Extra – Ministerial Departments to ensure that there are adequate systems in public funds and for the co-ordination of the collection and disbursement of public funds and for the co-ordination of accounting systems;
- Ensures Revenue Monitoring and accounting;
- Issues officially approved forms bearing Treasury Numbers for use in all Federal Ministries to ensure uniformity;
- Formulate the accounting policies of the Federal Government;
- Loans servicing and public debt management;

The office also manages all the Federal Pay Offices (FPOs) in the 36 states of the Federation. The office has six offices, one in each of geopolitical zones of the country coordinating the activities of the Federal Pay Offices in the zone.

3.3.3 Stake-watchers

Stake-watchers keep an eye on the industry operations in general. They serve as monitors of the industry operations. These stake-watchers cut-across different sectors of the Nigerian institutions; these include the various institutions that look after the stake of the real stakeholders (shareholders for example) with utmost scrutiny like the auditors, NEITI, the national assembly, including the pressure groups such as the trade unions and activists.

3.3.3.1 Auditor General of the Federation (AGF)

The Office of the Auditor-General for the Federation operates within the framework of the Nigerian Constitution. In carrying out its functions, the Office has eight Departments namely:

Ministerial Audit Department, Extra-Ministerial Audit Department, Revenue Audit Department, Project audit Department, Treasury Audit Department, Finance and Accounts Department, Administration and Human Resources Management Department, and Public Procurement Department[43].

[43] http://www.oaugf.gov.ng/structure.html

The Revenue Department was established primarily to ensure:

- Timely collection of revenue due to the Government.
- That amounts due are actually collected.
- That what is collected is properly accounted for in accordance with financial regulations and other extant rules.

In order to achieve these objectives the following divisions were created.

NOGRA1: for the audit of Non-Oil and Gas revenue in the Federal Capital Territory and Northern states of the Federation and FIRS headquarters and Tax Offices.

NOGRA2: for the audit of Non-Oil and Gas revenue in Lagos and the Southern States of the Federation and FIRS Area Tax Offices.
OGRA: audit of Oil and Gas revenue throughout the Federation.

From the foregoing, we can see that it is the OGRA that carries the audit of the oil and gas industry.

3.3.3.2 Nigeria Extractive Industry Transparency Initiative

The Nigeria Extractive Industries Transparency Initiative (NEITI) is an Agency charged with the responsibility, among other things, for the development of a framework for transparency and accountability in the reporting and disclosure by all extractive industry companies (including oil and gas companies) of revenues due to or paid to the Government of Nigeria.

The objectives of NEITI are as follows:

- Ensure due process, transparency and accountability in the payment made by extractive industry companies;
- Ensure due process, transparency and accountability in the revenue receipts of the Federal Government from extractive industry companies;
- Ensure accountability and transparency and the prudent management of the revenue accruing from oil, gas and mining payments;
- Ensure that all payments due to the Federal Government from extractive industry companies including taxes, royalties, dividends, penalties, levies are duly paid[44].

3.3.3.3 National Assembly Committees on Upstream Oil and Gas Sector

National assembly is saddled with the responsibility of law-making function. The national assembly has two separate units, which is the Senate and the House of representatives.

The Senate Committee on Upstream Oil and Gas Sector

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[44] http://neiti.org.ng/index.php?q=pages/secretariat

Order XIII 98 rule (54) of the Senate Standing Orders 2007 as amended states that there shall be a Committee to be known as Committee on Petroleum Resources appointed at the commencement of the life of the Senate; the jurisdiction of the committee shall include the followings:

- Exploration of hydrocarbons generally;
- Petroleum and petrochemicals;
- Energy conventions;
- Department of Petroleum Resources (DPR);
- Nigerian National Petroleum Corporation (NNPC);
- Nigerian Nuclear Regulatory Agency (NNRA);
- Petroleum Training Institute (PTI);
- Oil block allocation;
- Consideration and appropriation of Annual budget estimates of related institutions[45].

The House of Representatives Committee on Upstream Oil and Gas Sector

Order XVII Rule B. 55 (1) of the House Standing Order 2007 states that there shall be a committee to be known as Committee on Petroleum Resources of not more than 40 Members appointed at the commencement of the life of the House. The Committee's jurisdiction shall cover the following:

[45] http://www.nassnig.org/nass/committees.php?id=56

- Oversight over the Ministry of Petroleum Resources and the NNPC upstream activities;
- Oil exploration and exploitation;
- Energy conservation;
- Crude oil marketing and revenue therefrom;
- Matters relating to upstream petroleum sector generally except as may be assigned to other committee;
- Petroleum Technology Development Fund (PTDF);
- National Petroleum Investment management Services (NAPIMS);
- Nigerian Petroleum Development Company (NPDC);
- Department of Petroleum Resources (DPR);
- Oversight the board implication of NEITI;
- National Engineering and Technical Company (NETCO);

In conference with relevant Committee(s) examine and scrutinize the annual budget estimates of the NNPC and its subsidiaries and present same to the House for consideration and approval[46].

3.3.3.4 Trade Unions

The trade unions here include the various labour unions (both senior staff and junior staff) that are guarding the stake of their members in the oil and

[46] http://www.nassnig.org/nass2/committees.php?id=50

gas industry. In Nigeria, for example, there are two major trade unions in the oil and gas industry which are PENGASSAN and NUPENG.

PENGASSAN

PENGASSAN is the acronyms for Petroleum and Natural Gas Senior Staff Association of Nigeria (PENGASSAN) and it is one of the registered Senior Staff Associations in Nigeria. As a Trade Union, her members are Organised among Senior Staff in the temporary and regular employment in the Nigeria Oil and Gas Sector. Its key objectives include the following:

- To safeguard and protect the jobs of its members
- To ensure a safe and healthy working environment for its members
- To improve the terms and conditions of employment of its members
- To support and promote legislation in the interest of its members in particular, and Nigeria in general.

To render assistance to other trade union organizations in the spirit of cooperation and solidarity.

NUPENG

Another strong trade union in the Nigerian oil and gas industry is the NUPENG. The Nigeria Union of Petroleum and Natural Gas Workers (NUPENG) is one of the trade unions that are affiliated to the Nigeria Labour Congress. It aims at organising, protecting, promoting and defending the socio-economic and political interest of the oil and gas workers in Nigeria. Its objectives are as follows:

- To ensure the complete unionization of all workers employed in the petroleum and gas industry.
- To regulate the relations and settle disputes between members and employers and between a member and another.
- To obtain and maintain a just and equitable general conditions of service.
- To advance the education and training of members.
- To provide benefits and other assistance as provided in the Constitution.
- To encourage the participation of members in decision making in the undertaking both at industrial and National levels.
- To protect and advance the socio-economic and cultural interest of the community and such other objectives as are lawful and are not inconsistent with the spirit and practice of trade unionism.
- To promote and encourage International Fraternal relations with bodies having the interest of petroleum and Gas Workers.
- To establish and carry on or participate (financial and otherwise) in the business of the printing or publishing of a general Newspaper or of any other undertaking, industrial or otherwise, in the interest of or

with the main purpose of furthering the interest of the Union or trade unionism generally.

3.3.3.5 Activists

By activists here we mean those who mean good for the industry in general. These include the various civil society organisations and the human rights organisations. Therefore, the activists envisaged here do not include the terrorist groups who are false activists and are uncontrollable in their efforts to sabotage the industry operations. Although these terrorist groups consider themselves as part of the stakeholders, Fassin (2009, p. 122) argues that the "…more appropriate term might be 'stake imposters'".

It is important to clarify this issue in the Nigerian context. We do not refer to the immediate community where oil operation takes place and demand for responsible operations as false activists, but we argue here that where such activism is criminal in nature such so called activists do not form part of the stake-watchers envisage in this study.

3.4 Regulatory Framework

This section discusses the various laws and legislations governing the affairs of the oil and gas industry in Nigeria. However, it is important to state here that the two main laws are the Petroleum Profits Tax Act 1959 and the Petroleum Act 1969. Of course there are a myriad of other Acts, Legislations and Agreements governing the affairs of the industry, which are discussed accordingly. In fact, the main aim of the Petroleum Industry Bill[47] is to bring together these various Acts and Legislations into a single coherent Law.

Therefore, this section is sub-divided into four. Sub-section 3.4.1 discusses the Petroleum Profits Tax 1959; sub-section 3.4.2 discusses the Petroleum Act 1969; other Acts and Agreements are discussed in sub-section 3.4.3; and finally the Petroleum Industry Bill is discussed in sub-section 3.4.4.

3.4.1 Petroleum Profits Tax Act 1959

Petroleum Profit Tax (PPT) is the law governing the assessment of companies that are engaged in the upstream oil and gas operations and the collection of taxes therefrom. As mentioned in the previous chapter, oil was first traded in commercial quantity in 1958; this necessitated the need for a law specifically governing the affairs of petroleum operations in Nigeria; hence, the enactment of the Petroleum Act in 1959 (as amended 1990).

Below is a brief on the key aspects of the PPT Act 1959 as written by Oremade (1986, p. 44). That for any company to qualify for assessment under the law, such company must engage in petroleum operations as defined in the PPT Act. These operations include the winning or obtaining and transportation of petroleum or chargeable oil in Nigeria by or on behalf of a company for its own account and all operations incidental thereto and any sale of or any disposal of chargeable oil by or on behalf of the company.

[47] This bill is currently awaiting the ratification of the legislative arm of Government.

A company is required to be engaged in all the defined activities to qualify, and that for example, transportation without winning and sale will not qualify a company for this purpose that is the PPT. PPT is being administered by the FIRS. The following are some of the roles of FIRS:

- To carry out such acts as may be deemed necessary or expedient for the assessment and collection of the tax
- To sue and be sued in the official tax name
- To acquire, hold and dispose of any property taken as security for, or in satisfaction of any penalty, tax or judgment debt due from a company

It may authorise any person within or outside Nigeria to perform or exercise any of its powers or duties or receive any notice or other document to be served upon or delivered or given to the Service.

3.4.2 Petroleum Act 1969

> *"An Act to provide for the exploration of petroleum from the territorial waters and the continental shelf of Nigeria and to vest the ownership of, and all on-shore and off-shore revenue from petroleum resources derivable therefrom in the Federal Government and for all other matters incidental there to"*[48]

The above definition of encapsulates the essence of the Petroleum Act 1969. In the context of our study, two major sections of the Act are discussed hereunder.

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[48] The Petroleum Law 1969, No. 51, Laws of the Federation of Nigeria

3.4.2.1 Oil Exploration Licence, Oil Prospecting Licence & Oil Mining Lease

The rights to explore and exploit oil and gas in Nigeria are granted to investors by the Minister of petroleum through the Oil Prospecting Licence (OPL), which is converted to Oil Mining Lease (OML) once commercial quantities of oil are discovered. An OPL or OML is held by NNPC, the companies in Joint Venture with the NNPC, or by other companies as sole risk operators. See Appendix 13 for the relevant provisions in the Petroleum Act 1969.

3.4.3 Other Acts and Agreements

Other Acts aside the 1969 Petroleum Act that were promulgated before and after the 1969 Petroleum Act in order to enhance the operations of the sector include the following:

Oil Pipeline Act, Land Use Act 1978, Bendel State Land (Amendment) Edict No. 12 1978, Associated Gas Re-injection Act 1979, Ministry of Lands and Housing Directives, Special Tribunal (Miscellaneous Offences) Decree 1984, The Mineral Oil (Safety) Regulations 1963, Oil in Navigable Waters Act 1968, Income Tax Management Act 1961, Oil Terminal Dues Act 1969, Offshore Oil Revenues Act 1971, Offshore Oil Revenues (Registration of Grants) Act 1972.

Similarly, in order to provide for fiscal incentives that would encourage the upstream oil and gas companies to continue with their operations, Government entered into a number of agreements with the relevant companies, these agreements and/or memorandum of understanding (MOUs) were made in the following years 1971, 1986, 1987, 1991, 1994, 2000, 2002.

3.4.4 Petroleum Industry Bill (PIB) 2012

The PIB 2012, that is yet to be passed into law, puts together all the aforementioned Acts, legislations, and agreements in the oil and gas industry into a much more coherent piece of legislation. As succinctly stated by Lukman (2009, p.3) that the PIB is a:

> *"reform legislation which aims to put in place of the existing myriad of legislative and administrative instruments governing the petroleum industry one omnibus legislation that establishes clear rules, procedures and institutions for the administration of the petroleum industry in Nigeria."*

The PIB was first introduced in 2009, but as at 2014 the bill is yet to be passed into law. The journey of the PIB includes the following: The Petroleum Industry Draft Bill 2009 which was overshadowed by politics, the Government Memorandum on the PIB 2009, and the Petroleum Industry Bill 2012 that is now awaiting ratification of the National Assembly.

Some of the major highlights of the bill include the following:

It establishes a robust legal and regulatory framework for the various stakeholders (stake-holders, stake-keepers, and stake-watchers) in the industry:

- It establishes a dynamic fiscal regime that is fair to all and sundry;
- It stipulates transparent guidelines of operations for the aforementioned stakeholders for enhanced corporate governance;
- It aligns the industry operation to international best practice.

CHAPTER FOUR: RESEARCH METHODOLOGY AND METHODS

CHAPTER FOUR: RESEARCH METHODOLOGY AND METHODS

4.1 Introduction

The previous chapter discussed the theoretical framework underpinning this research. This chapter focuses on the research methodology and methods employed in this research.

First of all, it is important to clarify the concepts 'methodology' and 'methods' as the discussion in this chapter centres on them. As Ryan *et al.* (2002, p.36) stated, methodology is "the process of doing research" and methods are "the particular techniques used" in a particular research. Similarly, the process of doing research and the techniques used in that particular research are underpinned by some philosophical assumptions that normally differ based on the nature of that research and the views of the researcher (Burrell and Morgan, 1979). Consequently, the researcher's views will either implicitly or explicitly influence the types of research questions to be asked, the nature of data to be gathered, the kind of methods to be used, and ultimately, the process to adopt in carrying out such research (ibid.).

It is, therefore, important to note that the process (methodology) of doing research is easily delineated when the philosophical assumptions underpinning such research are clearly identified (Blaikie, 2007). In this context, Burrell and Morgan (1979) identified four distinct but related assumptions about the nature of social science and society, these include ontological, epistemological, human nature, and methodological assumptions; these assumptions are discussed in section 4.2. Section 4.3 discusses the research paradigms model proposed by Burrell and Morgan, the criticisms the Burrell and Morgan Model attracts from different quarters, the Chua framework (as one of the major critics of the Burrell and Morgan Model), the paradigms of accounting research, and the research paradigm adopted by the study. Subsequently, research methods (population of the study, sample size, nature of data and sources of data, variables used) are discussed in section 4.4 Section 4.5 presents summary of the chapter.

4.2 Philosophical Assumptions about the Nature of Social Science and Society

> *"It takes two of us to create a truth, one to utter it and one to understand it"*[49]

First of all it is important to explain why it is important to start this chapter with a discussion on philosophical assumptions; even though the thesis is of accounting background not philosophy. Therefore, this section is devoted towards addressing this very important issue. As Mitroff and Turoff (1975) stated, the underlying foundation of any scientific work, postulation of hypothesis or even the development of a theory is unpinned by some assumptions.

[49] Kahlil Gibran In Mitroff and Turoff (1975, p.17)

However, Mitroff and Turoff (1975) stressed that there is no 'best' way of conducting research using some specific assumptions. Hence, the assumptions of a researcher will largely depend on a particular approach the researcher adopts in his inquiry about the truth. Similarly, a researcher's assumptions are shaped and influenced by different factors; these include the experience of the researcher in a particular field of life, psychophysiological expressions of the researcher, educational level attained, and some environmental factors external to the researcher (Blaikie, 2007; Burrell and Morgan, 1979; Deetz, 1996; Turoff, 1975; Willmott, 1993).

In this context, philosophical assumptions, about social science, are discussed based on the four different approaches mentioned above (Burrell and Morgan, 1979). These approaches are neatly presented in the subjective-objective dimension, as depicts in Table 6 Below.

Table 6: The Burrell and Morgan Subjective – objective Dimension

The Subjectivist approach		The objectivist approach
Nominalism	← Ontology →	Realism
Anti-positivism	← Epistemology →	Positivism
Voluntarism	← Human Nature →	Determinism
Ideographic	← Methodology →	Nomothetic

Source: Burrell and Morgan (1979, p. 3)

4.2.1 Ontological Assumptions

> *"the mind is but a barren soil; a soil which is soon exhausted, and will produce no crop, or only one, unless it be continually fertilized and enriched with foreign matter"*[50]

First of all, ontology is a branch of philosophy that deals with the nature of 'being' and 'reality' and the term 'ontological' refers to "philosophical questions relating to the nature of being and the reality, or otherwise, of existence (Somekh, 2011, p. 326). In this context, Burrell and Morgan (1979, p.1) stated that ontological assumptions are basically concerned with the "... very essence of the phenomena under investigation", that is the nature of reality. Hence, the basic ontological question faced by a researcher is "...

[50] Sir Joshua Reynolds in Mitroff and Turoff (1975)

whether the 'reality' to be investigated is external to the individual ... or the product of individual consciousness".

As succinctly stated by Scheele (1975, p. 37) in Turoff (1975) that the term reality is a name "we give our collections of tacit assumptions about what is. We bring along these realities to give meaning to our interactions". Hence, the key point to be noted here is that our realities are defined by the caricature of interactions in the various aspects of our lives.

As can be seen in Table 7 above, the ontological assumptions, as modelled by Burrell and Morgan, can be identified under the subjective-objective dimension. This is about the question of whether 'reality' subsists within individual mind (nominalism) or being a product of an objective nature (realism).

Affirming this point, Burrell and Morgan (1979, p. 4) stated that:

> *"the nominalist position revolves around the assumption that the social world external to individual cognition is made up of nothing more than names, concepts and levels which are used to structure reality. The nominalist does not admit to there being any 'real' structure to the world which these concepts are used to describe."*

However, the realist point of view about the reality is that "...there is only one reality" which is external to the researcher and can be objectively described (Collis and Hussey, 2009, p. 59), because the reality is made up of real, hard and tangible structures (Burrell and Morgan, 1979). In this context, Morgan and Smircich (1980) provided six ontological assumptions, these assumptions are provided in Table 7 below:

Table 7: Morgan and Smircich's Six Ontological Assumptions

Category Assumptions
Reality as a concrete structure (naïve realism)
Reality as concrete process (transcendental realism)
Reality as a contextual field of information (contextual relativism)
Reality as a symbolic discourse (transcendental idealism [Kant])
Reality as social construction (social constructionism [socially mediated idealism])
Reality as a projection of human imagination (idealism [Berkeley])

Source: Morgan and Smircich (1980, p. 492)

In the context of Morgan and Smircich's six ontological assumptions provided above, Ryan *et al.* (2002) opined that the world can be viewed via different alternatives ranging from the concrete structure to the projection of human imagination. This, in essence, provides us with the instrument of viewing reality from the most objective as well as the most subjective points of view respectively.

That said, it is now appropriate to discuss the ontological assumptions underpinning this research. As the research aims at investigating the effect of Government control on the performance of oil and gas companies, and considering the research questions focusing on the performance variables that can be measured objectively using scientific enquiry approach that is independent of the researcher. Hence, the ontological assumptions underpinning this study are based on the realist perspective. However, it is important to explain the type of realist assumptions underpinning this study, as there are six categories of ontological assumptions, i.e. shallow realist, conceptual realist, cautious realist, depth realist, idealist, and subtle realist (Blaikie, 2010).

This study adopts the cautious realist perspective as it is believed that, as humans, it is “impossible” for us to perceive the reality “accurately”, even though it is external to us (Blaikie, 2010, p. 15). Therefore, there is the need for us, as social scientists, to be cautious about our assumptions considering the inherent human imperfections (ibid.).

4.2.2 Epistemological Assumptions

The term ‘Epistemology’ is also a branch of philosophy that is concerned with the theory of knowledge and the use of knowledge to know the world around us (Jary and Jary, 2000). Hence, an epistemological assumption is concerned with the validity of knowledge and what really constitutes an acceptable knowledge in a particular field (Bryman and Bell, 2007).

In this regard, Burrell and Morgan (1979) distinguished between the two perspectives via which one can understand the world around him and communicate knowledge about it. These, as depicted in Table 7 above, are anti-positivism and positivism perspectives, which are along the subjective-objective dimension respectively.

Burrell and Morgan (1979, p. 2) opined that as a social scientist, a researcher needs to address the question as to whether "knowledge is something which can be acquired", that is from the positivist perspective or from the anti-positivist perspective as "something which has to be experienced".

Looking at knowledge from the positivist perspective, it is argued that the social world can be studied by applying the same principles and by using the same procedures as used in the natural science (Bryman and Bell, 2007). In this regard, the positivists argue that a researcher can maintain his independent position while providing an objective view of the world being investigated.

On the other hand, the anti-positivist theorists argue that the principles and procedures used in the natural science cannot and should not be used to study the social world (ibid.). The argument of the anti-positivists is based on the fact that "the subject matter of the social sciences – people and their institutions – is fundamentally different from that of the natural sciences" (Bryman and Bell, 2007, p. 16). Therefore, the anti-positivist view is that the social world "can only be understood from the point of view of the individuals who are directly involved in the activities which are to be studied" (Burrell and Morgan, 1979, p. 5).

As explained under the ontological assumptions, it is important to also explain the epistemological assumptions adopted in this study. In this regard, considering the research questions focusing on the performance variables that can be measured objectively using scientific enquiry approach that is independent of the researcher, this study adopts the positivist perspective.

However, a falsification[51] approached is considered appropriate here; as it is believed to cater for the short-comings associated with the 'pure' positivist view (Blaikie, 2010). It is important to note here that the falsification approach towards investigating the social world is closely associated with the cautious realist approach adopted under the ontological assumption underpinning this study.

4.2.3 Assumptions about Human Nature

Assumptions here are on human beings and their relationship with their environment. According to Burrell and Morgan (1979) model, as depicted in

[51] This is normally known as a 'hypothetico-deductive method' (Blaikie, 2010, p. 21). The hypothetico-deductive method is based on theory testing by using available data.

Table 7 above; there are two approaches to assumptions about human nature. These are voluntarism and determinism based on the subjective-objective dimension respectively. The voluntarism and determinism are two opposing perspectives on the views of human beings in relation to their environment; these can be neatly presented in Table 8 below:

Table 8: Assumptions about Human Nature

Voluntarism (subjectivist dimension)	Determinism (objectivist dimension)
Humans operate in mechanistic environment	Humans operate in deterministic environment
Humans are product of their environment	Humans are creators of their environment
Humans are conditioned by their environment	Humans control their environment
Humans are marionette in their environment	Humans are masters of their environment

Source: (Burrell and Morgan, 1979, p. 2)

The above division on the assumptions about human nature makes out the "philosophical debate between the advocates of determinism on one hand and voluntarism on the other" (Burrell and Morgan, 1979, p. 2). Assumptions about humans in this study are made from the objectivist perspective.

4.2.4 Methodological Assumptions

As explained in section 4.1 above, methodology entails the 'process' of doing research (Ryan *et al.*, 2002), which in turn requires logical approach to answering research questions raised in the course of literature review (Blaikie, 2010). It is important to note here that the aforementioned ontological and epistemological assumptions discussed in sections 4.2.1 and 4.2.2 respectively, as well as the assumptions about human nature in section 4.2.3 constitute the foundation for any methodological assumptions about any research. In this regard, the Burrell and Morgan's (1979, p. 3) subjective-objective dimension of methodological assumptions are discussed.

From the objective standpoint of the methodological assumption, nomothetic assumptions are employed by considering that the social world can be understood using systematic approach normally used in the natural sciences. On the other hand, the subjective methodological approach is based upon ideographic assumptions that the social world can best be understood by obtaining the "first-hand knowledge of the subject under investigation" (Burrell and Morgan, 1979, p. 6).

Consistent with the ontological and epistemological assumptions adopted above, this study adopts the objectivist approach towards answering the research questions raised regarding the effect of Government control on the performance of upstream oil and gas companies operating in Nigeria. Furthermore, a deductive strategy is used which is consistent with the hypotheses developed in chapter two. Therefore, it is important to clearly indicate the strategy being adopted within the objectivist approach.

As Blaikie (2010) stated, the natural science involves three major research strategies, these include the inductive, deductive and retroductive research strategies. These strategies differ fundamentally from one another in terms of their ontological and epistemological assumptions, starting points of an enquiry, logic of enquiry, use of concepts and theories, styles of explanation, and the status of their products, as succinctly stated by Blaikie (2010, p. 56-56):

> *"one involves collecting data and generalizing from them; another starts by finding a suitable theory that will provide some hypotheses to test; a third searches for underlying causal mechanisms."*

Furthermore, as Blaikie (2010, p. 8) stated, the aim of an inductive strategy is to establish a theory to be used as pattern of explanations, it begins with the collection of data in order to generate such theory, when the theory is produced it is used to explain further observations. On the other hand, the aim of the deductive strategy is to test theories so as to eliminate the false ones and corroborate the survived ones. Thus, a deductive approach begins with the identification of a regularity to be explained, construct a theory and deduced some hypotheses, and then tests the hypotheses by matching them with data. The retroductive research approach combines elements of both the inductive and deductive approaches. Hence, a deductive approach is adopted in this study.

4.2.5 Assumptions about the Nature of Society

Burrell and Morgan (1979) stated that assumptions about the nature of society can be viewed from the standpoint of the 'order-conflict'. On one hand, the 'order' view of the society encompasses stability, integration, functional coordination, and consensus. On the other hand, the conflict view of the society encompasses change, conflict, disintegration, and coercion.

In this regard, it can be deduced that the 'order' view entails explanation about the 'nature of social order and equilibrium' and the conflict view entails explanation about the 'problems in the social setting'. However, 'regulation' and 'radical change' will be adopted in place of 'order' and 'conflict' respectively (Burrell and Morgan, 1979).

4.2.6 Assumptions Underpinning this Study

As mentioned in section 4.2.1 above, this study adopts the cautious realist perspective as it is believed that it is impossible for us to perceive the reality accurately, even though it is external to us. Therefore, there is the need for us to be cautious about our assumptions on the factors affecting the performance of the upstream oil and gas companies operating in Nigeria. We are being cautious in the sense that not all factors affecting the companies' performance can be accurately captured by our model (s).

Hence, we can only draw conclusions based on the variables employed in our models.

Secondly, as mentioned in section 4.2.2 above, this study adopts a falsificationist approach in trying to determine the extent to which Government control affects performance of the upstream oil and gas companies operating in Nigeria. In this regard, an agency theory is adopted in order to test its validity in relation to the control mechanism (ownership in JVCs) used by Government (as a principal) and the effect of such control mechanism on the performance of the upstream oil and gas companies (as agents). Hence, a deductive strategy is adopted in order to test the hypotheses developed.

Overall, our assumptions about the factors affecting performance of the upstream oil and gas companies operating in Nigeria may not be completely accurate. However, considering the nature of the upstream operations in Nigeria and the role of Government in such operations, our assumptions may be considered relatively realistic and the methodology to be used fairly robust.

4.3 Research Paradigms

The term "paradigm" is defined differently by different people, see for example Burrell and Morgan (1979); White (1983); Hopper and Powell (1985); Chua (1986); Morgan (1990); Guba and Lincoln (1994); Laughlin (1995); Gummesson (1999); Collis and Hussey (2003) and Collis and Hussey (2009). For example, Gummesson (1999, p. 16) described research paradigm as "the underpinning values and rules that govern the thinking and behaviour of researchers". However, Collis and Hussey (2003, p. 46) defined research paradigm as "the process of scientific practice based on people's philosophies and assumptions about the world and the nature of knowledge".

Nonetheless, despite the differing views on what constitute research paradigm, what is common in all the views is that research paradigm provides a researcher with a framework for better understanding of the problem that is being investigated. The aforementioned studies attempted to develop a reliable classification of a research paradigm that can be used in social sciences. However, the Burrell and Morgan's (1979) model is considered the most comprehensive in the world of social sciences research (Morgan, 1990 and White, 1983). Thus, the next section discusses the Burrell and Morgan's (1979) model in detail.

4.3.1 The Burrell and Morgan Research Paradigms

Burrell and Morgan (1979) developed a two-by-two matrix depicting their four research paradigms. These paradigms cut across the assumptions about the nature of social science on one hand and the nature of society on the other. Table 9 below depicts the horizontal axis representing subjective-objective dimension and the vertical axis representing the regulation-radical change dimension.

Table 9: Burrell and Morgan Research Paradigms Matrix

	The Sociology of Radical Change		
Subjective	Radical Humanist	Radical Structuralist	**Objective**
	Interpretive	Functionalist	
	The Sociology of Regulation		

Source: Burrell and Morgan (1979, p. 22)

These paradigms are referred to as functionalist, interpretive, radical humanist, and radical structuralist. It is important to note here that the dichotomous nature of these paradigms is what makes the Burrell and Morgan's (1979) model not only unique but also generated a lot of criticisms (discussed in section 4.3.2. below). These paradigms are discussed in detail below.

4.3.1.1 Functionalist Paradigm

This paradigm involves realist ontology, a positivist epistemology, a deterministic model of human nature, and a nomothetic methodology. Theorists belonging to the functionalist paradigm adopt methods of analysis that are normally used in the natural sciences. This is because such theorists believe that our social world is concrete and relationships within its constituents can be identified and analysed using models commonly used in the natural science.

This view has been reaffirmed by the Burrell and Morgan (1979, p. 25) that "... the social world is composed of relatively concrete artefacts and relationships which can be identified, studied and measured through approaches derived from natural sciences". It is important to note here that, this paradigm dominates accounting and finance research (see for example Chua, 1986; Hopper and Powell, 1995; Ryan *et al.,* 2002).

4.3.1.2 Interpretive Paradigm

This paradigm involves a subjectivist point of view about the society and social science. It adopts a nominalist ontology, an anti-positivist epistemology, a voluntarist model of human nature and an ideographic methodology. This paradigm provides explanation on the status quo of the society and its constituents. As Burrell and Morgan (1979, p. 28) aptly stated that this paradigm is adopted in order to "... understand the world as it is..."

Hence, theorists using this paradigm are only interested in investigating and understanding their social world without any attempt to change it. In doing so, a theory is developed based on the understanding of the problem being investigated via an interaction between the researcher and the subjects of the researcher.

4.3.1.3 Radical Humanist Paradigm

This paradigm adopts nominalist ontology, an anti-positivist epistemology, a voluntarism model of human nature and an ideographic methodology on the one hand, and radical change, modes of domination and potentiality on the other hand. We can see that this paradigm shares the aforementioned assumptions with the interpretive paradigm based on the subjective view about the social science.

4.3.1.4 Radical Structuralist Paradigm

This paradigm adopts realist ontology, a positivist epistemology, a deterministic view of human nature, and a nomothetic methodology. This paradigm shares its assumptions with that of the functionalist of paradigm regarding the social science. On the other hand, it concerns itself with developing a society from the radical perspective via a "... radical change, emancipation, potentiality, structural conflict, modes of domination and deprivation" (Burrell and Morgan, 1979, p. 34).

4.3.2 Critique on Burrell and Morgan Model

Despite the prominence the Burrell and Morgan (1979) model gained in the world of social science research (see for example Ryan *et al.*, 2002 and Chua, 1986), the model has generated a myriad of academic debate based on the criticisms it generated. This is because Burrell and Morgan (1979, p.67) argued that the aforementioned paradigms are alternatives to one another; that is "... one cannot operate in more than one paradigm at any given point in time since in accepting the assumptions of one, we defy the assumptions of all the others".

Hence, such paradigms are mutually exclusive; an issue that formed the basis for the criticisms attracted by their model, despite being very important in methodological assumptions underpinning research in accounting and finance (see for example Hopper and Powell, 1985; Chua, 1986; Laughling, 1995; Ryan *et al.,* 2002; Saunders *et al.,* 2009).

The model has been criticised on a number of grounds by different researchers, see for example Hopper and Powell (1985); Chua (1986) and Laughlin (1995). These criticisms are discussed hereunder. In this context, Hopper and Powell (1985) argued that the Burrell and Morgan model only dealt with the subjective–objective dimension of social science, which is not the only aspect researchers consider while conducting a research.

Similarly, Chua criticised the Burrell and Morgan's (1979) model based on the following reasons. Firstly, their use of 'mutually exclusive' dichotomy on their paradigms makes it impossible for a researcher to adopt two or more research paradigms at a time. Secondly, they wrongly misinterpreted Kuhn's argument as advocating irrational paradigm choice. Thirdly their encouragement of latent relativism of truth and reason; and lastly, their model is not very clear about the difference between the 'radical structuralist' and 'radical humanist' paradigms.

Consequently, Chua developed the model of methodological assumptions in accounting and finance research which is categorised into beliefs about knowledge, beliefs about physical and social reality, and relationship between theory and practice, these assumptions are presented in Table 10 below:

Table 10: Chua's Classification of Methodological Assumptions

A	Beliefs About Knowledge
	Epistemological
	Methodological
B	Beliefs About Physical and Social Reality
	Ontology
	Human Intention and Rationality
	Social Order/Conflict
C	Relationship Between Theory and Practice

Source: Chua (1986, p. 604)

Assumptions about knowledge are categorised into two: epistemological and methodological. Chua (1986, p 604) stated that epistemological assumptions are assumptions about decision on "... what is to count as acceptable truth by specifying the criteria and process of assessing truth claims."

On the other hand, the methodological assumptions are concerned with "... the research methods (that are) deemed appropriate for the gathering of valid evidence" to be used in a particular research. Secondly, assumptions about the physical and social reality are based on the assumption that reality exists 'independent' of the researcher. Lastly, assumptions about theory and practice are based on the relationship between the knowledge and the 'truth' about the empirical world.

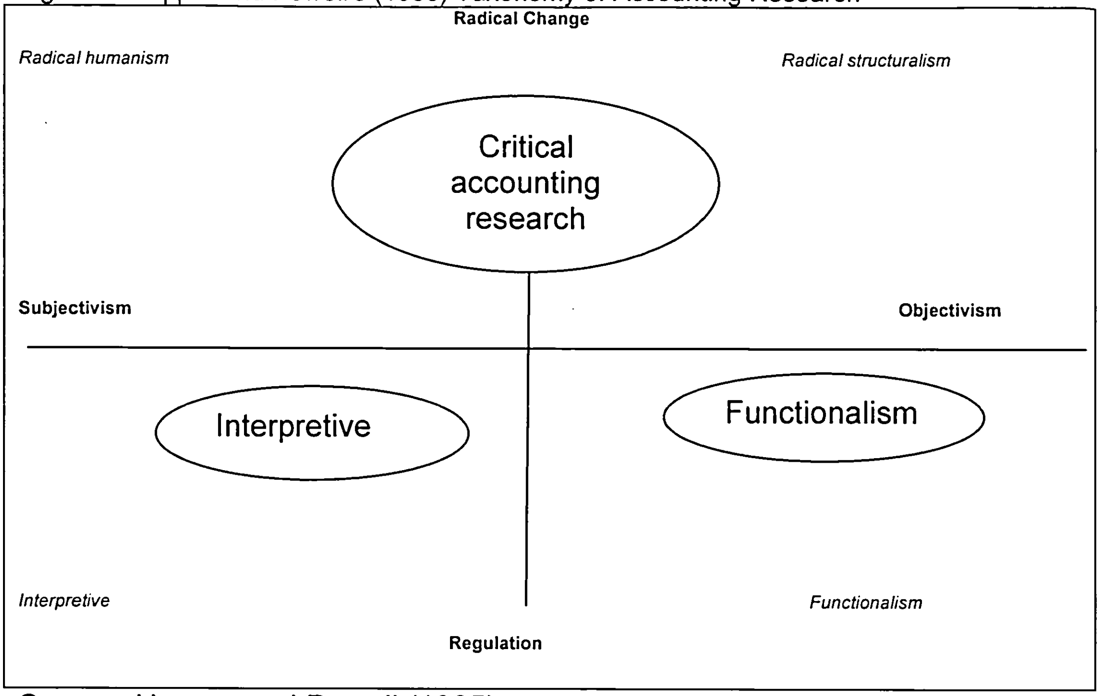
Consequently, Chua's assumptions are considered to be assumptions about the conventional accounting that are interpretive in nature and critical by substance. In a nutshell, while the Burrell and Morgan's (1979) model argues for mutual exclusiveness amongst the four research paradigms, Chua's (1986) model argues for establishing and assessing the strengths and weaknesses of such 'alternative' assumptions in the context of conventional accounting and finance research. This is particularly important in accounting research as aptly stated by Ryan (2012) that an interesting aspect of accounting research is that it cuts across many 'boundaries'. Hence the need for us to consider the paradigms normally used in accounting research, an issue discussed hereunder.

4.3.3 Paradigms used in Accounting Research

As argued by Ryan *et al.* (2002) that accounting research cuts across many boundaries, understanding and appropriately using the right paradigms will go a long way in developing good accounting theories. For example, Hopper and Powell (1985) viewed that accounting theories can be classified, by using the aforementioned Burrell and Morgan model, into three; that is the mainstream accounting research, the interpretive accounting research, and the critical accounting research. The Hopper and Powell's (1985) categorisation is provided in Figure 1 below.

First of all, in the context of Burrell and Morgan's model, the functionalist research paradigm in the Hopper and Powell's categorisation is argued to be consistent with the mainstream accounting research (Hopper and Powell, 1985; Chua, 1986; Ryan *et al.,* 2002). For example, adopting a particular theory to test hypotheses is in line with the positivist epistemological assumptions based on the methods commonly used in the natural sciences.

Figure 1: Hopper and Powell's (1985) Taxonomy of Accounting Research



Source: Hopper and Powell (1985)

Secondly, the interpretive accounting research paradigm adopts a different approach to accounting research than the functionalist approach. This approach is adopted from the Burrell and Morgan's model in order to have a good understanding of the 'social nature of accounting' problem under investigation based on the human behaviour that is believed to be behind the actions of human beings (Ryan *et al.* 2002).

Thirdly, the critical accounting research paradigm encompasses both the radical humanist and radical structuralist under the Burrell and Morgan's (1979) model. Hence, Hopper and Powell (1985) argue that the shortcomings associated with the subjective-objective dimensions in the

Burrell and Morgan's (1979) model are adequately taken-care of. Under the critical accounting research paradigm, researchers consider acquisition of knowledge via qualitative enquiry - similar to that of the interpretive paradigm (Hannah, 2003).

In a nutshell, while section 4.3.1 above considers the critics of the Burrell and Morgan's (1979) model on the possible research paradigms to be adopted by a researcher in a particular research, and the research paradigms used in accounting research, discussed in section 4.3.2 above, the bottom-line is adopting the most appropriate paradigm in the context of one's research. Hence, the next section discusses the paradigm adopted by this study.

4.3.4 Research Paradigm Adopted by this Study

The discussions above focused on the different research paradigms a researcher can adopt in his or her research, which was mainly based on the Burrell and Morgan's (1979) model. Subsequently, critics of the Burrell and Morgan's model were discussed, and finally the research paradigms used in accounting research were also discussed. Therefore, this section discusses the research paradigm adopted in this study.

In particular, this study adopts functionalist research paradigm which falls within the objectivist dimension and the sociology of regulation that is based on both the Burrell and Morgan's (1979) model and the Hopper and Powell's (1985) taxonomy of accounting research.

4.4 Research Methods

Quantitative research approach is adopted for the purpose of collecting and analysing data in this study. The quantitative method is argued to be more scientific than the qualitative method in conducting research that involves establishing a relationship between variables or measurement of effect of one variable on another (Sheila, 2009). As aptly stated by Sheila (2009, p. 12) that quantitative method involves "statistical and numerical measurement of the raw data ... the results can be used as a benchmark ... and ... can be compared". On the other hand, the qualitative research approach is argued to be a more useful way of understanding the views, experiences, and perceptions of the researched (Spencer *et al.*, 2003).

However, considering the nature of this study, that is establishing the effect of Government control on the upstream oil and gas companies' performance, quantitative research approach is considered to be more suitable for this study. Nonetheless, a qualitative approach may be used in the future (where there is access for such) for validation of the findings of this study.

Using a quantitative approach is in line with the hypotheses developed, in the context of agency theory, which will be either validated or rejected. Details of the research methods such as the population of the study, sample size, data and sources of data, variables definition and model specification are provided hereunder.

4.4.1 Population of the Study

Companies involved in the upstream operation in Nigeria constitute the population of this study, and these companies include both IOCs and indigenous oil companies. Based on the NNPC ASB of 2012, there are 31 upstream oil and gas companies engaged in the exploration and production of crude oil (NNPC, 2012, p. 9).

These companies engage in different upstream operations ranging from the JV operation, PSC, SC, and marginal field operators. Hence, the upstream oil and gas companies that engaged in the exploration and production during the period 1999 -2007 formed the population of the study.

4.4.2 Sample Size

Obtaining complete data on all the upstream oil and gas companies operating in Nigeria is not feasible; thus, the need for sampling from the population. In this regard, a convenience sampling method was adopted based on the availability of data from some of the upstream oil and gas companies. Hence, the upstream oil and gas companies that operated during the period (1999 – 2007) and have complete data on the aforementioned variables automatically formed part of the sample.

The sample of the study comprises of 5 JVCs and 3 non-JVCs, i.e. 8, making the sample 26% of the total population. It is important to note here that this sample (26%) produces more than 80% of the total crude oil production. It is important to note here that the identity of the sample is not identified in this study due to the sensitive nature of the data analysed.

4.4.3 Sampling Procedure

This study used a non-probability sampling procedure where a convenience sampling was used (Krippendorff, 2004). As stated by Leedy and Ormrod (2005, p. 206) that a convenience sampling makes no claim of ascertaining a "representative subset of the population. It takes ... units that are readily available." Indeed, Leedy and Ormrod's view explains the reality in the context of this study. This is because companies with complete dataset required for the purpose of this study were selected to form the sample of the study.

4.4.4 Limitations of the Sampling Procedure

Although the sample for the study is representative, i.e. 26% of the sampling frame (31 upstream oil and gas companies), some of the limitations associated with the sampling procedure can be attributed to non-probability process of selecting the companies. Secondly, since not all the upstream oil and gas companies had equal chance of being selected, by only considering the companies with complete data, automatically prevented some of the companies from being part of the sample; this raises the issue of being biased in the selection process of the sample. Nonetheless, considering the importance for having complete data for this analysis and the difficulty to obtain such data from the remaining companies, such limitations can be considered as "... less important where there is little variation in the population ..." (Saunders *et al.*, 2007).

4.4.5 Nature and Sources of Data

This section discusses the sources of data used in this study. Researchers employ various procedures of obtaining data relevant for their studies, these include interview, observation, content analysis, questionnaire based surveys, case studies among others (see for example Jonker and Pennink, 2010; Hoque, 2006; Parahoo, 2006; Collis and Hussey, 2003; Smith, 2003; Creswell, 1998; Remenyi *et al.*, 1998; Sekaran, 1992; de Vaus, 1991 and Morgan and Smircich, 1980).

Therefore, researchers select the most appropriate method (s) they consider being the most suitable for the collection and analysis of data in their research (Spencer *et al.,* 2003). In this regard, considering the performance measures to be investigated in this study and the availability of data on such performance measures, this study considered using a secondary data readily available at the public domain. Consequently, the quantitative nature of this study and the availability of data influenced the choice and usage of secondary data.

Our dataset is secondary in nature and it includes the following: volume of crude oil produced, operating expenditure (OPEX), capital expenditure (CAPEX), wells drilled (both exploratory and development wells), royalty payment, and prices of crude oil (both domestic and international prices).

The source of our data includes NNPC annual statistical bulletins (ASB) from 1999 to 2007; NEITI audit reports for the period 1999 – 2004, 2005, and 2006 – 2008; Central Bank of Nigeria annual reports; companies' websites and/or reports (where available).

Data on upstream operation are generally lacking in Nigeria. For example, data on crude oil production on a company-by-company basis are only available (at public domain) for the period 1997 – 2013[52]; and data on royalty payments are only available for the period 1999 – 20011. However, data on OPEX and CAPEX (the important variables in this study) are only available (at public domain) for the period 1999-2007 (NEITI, 2006; NEITI, 2008; NEITI 2011). Hence the selection of the period (1999-2007) because of the availability of complete data needed for this study.

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52 http://www.nnpcgroup.com/PublicRelations/OilandGasStatistics/AnnualStatisticsBulletin/MonthlyPerformance.aspx

4.4.6 Method of Data Analysis

The data analysed by this study involve both cross-sectional and time-series. They are cross-sectional because they cut across different upstream oil and gas companies (both JVCs and non-JVCs) and they are time-series because they involve different periods (1999 – 2007); hence, these type of data are referred to as panel data (Kennedy, 2003).

This study employed a multivariate regression analysis based on the panel dataset available. Panel data regression technique allows for multiple cases to be observed at two or more periods. Therefore, the cross-sectional information reflected in the differences between companies and the time-series information reflected in the changes within companies over time provide rich information about the companies; hence more variability is obtain in the dataset. More so, the problem of multicollinearity is mitigated while controlling for individual heterogeneity (Greene 2000, Brooks 2008).

The aforementioned benefits associated with the panel data influenced the researcher's decision to employ such technique for a robust analysis that will reflect the distinctive and unique nature of the upstream oil and gas companies, especially in the Nigerian case where there are differences in the ownership of such upstream oil and gas companies, but operating within the same environment.

4.4.6.1 Model Specification

Following Brooks' (2008) modeling, the panel regression model to be used in this study is in the form of:

$$y_{it} = \alpha + \beta x_{it} + u_{it} \tag{1}$$

The independent variables are all captured by x_{it}. Individual effect is α that is taken as constant over time (*t*) and is specific to each company (*i*); where α is considered to be uniform across all companies, in this case the ordinary least squares (OLS) provide efficient estimate of α and β (Greene 2000). However, if heterogeneity exists across companies, the OLS will lead to a heterogeneity bias because the differences across companies have not been captured by the OLS. Hence, the two approaches that are normally applied in addressing the issue of heterogeneity bias will be adopted, these are: (i) the fixed-effects model, and (ii) the random-effects model.

Under the fixed-effect approach, α is taken to be a company specific constant term. Therefore, by decomposing the u, into a company specific effect, μ_i and the 'remainder disturbance', v_{it} (idiosyncratic error term), that varies over time and companies "capturing everything that is left unexplained about y_{it}" (Brooks 2008, p.490). Hence, the equation below:

$$u_{it} = \mu_i + v_{it} \tag{2}$$

Now we can re-write equation (1) as follows:

$$y_{it} = \alpha + \beta x_{it} + \mu_i + \upsilon_{it} \tag{3}$$

We now consider company heterogeneity μ_i that affects y_{it} across companies but does not vary over time. In this context, let us consider hypothesis 8; ***Hypothesis*** $_{8.A}$ ***states that JVCs are more efficient than the non-JVCs***. In essence, cost efficiency is assumed to vary across the upstream oil and gas companies based on their ownership status (JVCs and non-JVCs). Although the cost efficiency is hypothesised to vary across companies, the ownership status remains fixed over time. Therefore, efficiency differentials based on different ownership status can be estimated using the least squares dummy variable (LSDV) approach as follows:

$$y_{it} = \beta x_{it} + \mu_1 D1_i + \mu_2 D2_i + \mu_3 D3_i + ... + \mu_N DN_i + \upsilon_{it} \tag{4}$$

The LSDV set out in equation (4) above includes a company-specific dummy variable D_i that changes the intercept α for each company. Thus, the effect of ownership type can be easily determined on the efficiency of the companies that have different ownership status. In summary, the LSDV provides unbiased coefficients β because the companies' differences are considered to be correlated with the independent variables.

In the case of equation (4) above, our dependent variable is the unit cost of producing crude oil per barrel of oil based on the total oil produced and the total costs incurred in relation to such production. Similarly, the independent variables include the production volume, OPEX, royalties, and a dummy variable capturing the ownership type of the companies (= 1 if a JVC, 0 otherwise). Hence the equation (5) below:

$$lcostbbl_{it} = \alpha + \beta_1 loutput_{it} + \beta_2 lopex_{it} + \beta_3 lroyalty_{it} + \beta_4 own\_loutput_{it} + \beta_5 own\_lopex_{it} + \beta_6 own\_lroyalty_{it} + \varepsilon_i + \vartheta \qquad (5)$$

More so, considering the effect of AF on performance of the JVCs, we can adopt a time-fixed effects model. Using the time-fixed effects model, the intercepts are assumed to vary over time, that is pre and post AF periods, but not across the JVCs. The time-fixed effects model to be used is in the form of:

$$y_{it} = a + \beta x_{it} + \gamma_t + v_{it} \qquad (6)$$

Where γ_t represents the AF period which is associated with all the independent variables assumed to affect y_{it}, that is the individual performance measures. Hence, the least squares dummy variable model in equation (7) below:

$$y_{it} = \beta x_{it} + \lambda_1 D1_t + \lambda_2 D2_t + \lambda_3 D3_t + \ldots + \lambda_T DT_t + v_{it} \qquad (7)$$

Therefore, hypotheses 1 – 7 can be tested using equation (8) below. In essence, the effect of AF arrangement on performance of the JVCs post-AF period can be determined by using the following model:

$$PERF_{it} = \alpha_i + \beta_{1i} * AF_{it} + \beta_{2i} * TIME_{it} + \beta_{3i} * TIME * AF_{it} + \gamma_1 * SIZE_{it} + u_{it} \quad (8)$$ [53]

Where AF captures performance differentials before and after AF arrangement, *TIME * AF* captures changes in performance trend, and the effect of AF can be observed from the coefficients of *AF* and *TIME * AF*. In essence, a positive coefficient of *TIME * AF* indicates an improvement in performance post-AF period. However, a negative coefficient of *TIME * AF* indicates that the AF negatively affects a particular performance variable. Nonetheless, other factors beyond the AF arrangement may also affect the performance of the upstream oil and gas companies. For example, the size of the companies differs substantially. In this case, a control variable, γ is needed in order to capture SIZE effect, hence, the variable $\gamma_1 * SIZE_{it}$.

Consequently, we can now incorporate our LSDV models above, equations (4) and (7). Hence, the equation (9) below:

$$\begin{aligned} y_{it} = \beta x_{it} + \mu_1 D1_i + \mu_2 D2_i + \mu_3 D3_i + \ldots + \mu_N DN_i + \lambda_1 D1_t + \lambda_2 D2_t + \lambda_3 D3_t + \\ \ldots + \lambda_T DT_t + v_{it} \end{aligned} \quad (9)$$

On the other hand, if the companies' differences are not correlated with the independent variables, then we can assume that the causes of differences are random in nature. In this case, it does not matter whether the company in question is either a JVC or a non-JVC. Therefore, we can assume that such effect is random in nature. Therefore, for us to be able to properly

[53] See Villalonga (2000, p. 57) for the use of similar model in determining the effect of privatization on the performance of companies pre and post-privatisation periods.

address the aforementioned issues, there is the need for us to adopt a random-effects model (REM). The REM is specified below:

$$y_{it} = \alpha + \beta x_{it} + \omega_{it}, \quad \omega_{it} = \varepsilon_i + \upsilon_{it} \tag{10}$$

The REM considers α being a group specific disturbance that is captured by random error term ε_i, which is independent of the individual observation error term υ_{it} and the independent variables x_{it}.

In the context of equation (10) above, our dependent variable is the gross margin based on earnings before interest and tax (EBIT). Similarly, our independent variables include the quantity of crude oil produced, OPEX, royalty payments, petroleum profit tax, oil price as obtained from the NNPC records, and ownership type as a dummy variable which is interacted with the aforementioned independent variables. Hence the equation (11) below:

$$\begin{aligned} lgrossmargin_{it} &= \alpha + \beta_1 loutput_{it} + \beta_2 lopex_{it} + \beta_3 lroyalty_{it} + \beta_4 lppt_{it} + \beta_5 own\_loutput_{it} \\ &+ \beta_6 own\_lopex_{it} + \beta_7 own\_lroyalty_{it} + \beta_8 own\_lppt_{it} + \beta_9 loilprice_t + \varepsilon_i \\ &+ \vartheta \end{aligned} \tag{11}$$

Finally, below is the summary of our model:

Panel data type:

The panel data used in this study is a long panel. A long panel data involves many time periods and few cases. In the context of this study, we have 108 months observations on each and every company; making the total observations to be 972.

Regressors:

We have three types of regressors in our models, these include: varying regressors, time-invariant regressors, and individual-invariant regressors. The varying regressors (x_{it}) include crude oil production (output), operating expenditure (opex), royalty payments (royalty) and petroleum profit tax (PPT). These variables vary according to companies' performance and are not similar to one another on a company-by-company basis.

Time-invariant regressor (x_{it} = x_i for all t) in our models is basically the ownership type of the companies. This is either a JVC or a non-JVC, this ownership type does not vary over time (at least during the period of the study).

Individual-invariant regressor (x_{it} = x_t for all i) in our models is the oil price (oilprice) which does not vary based on companies' ownership type but uniformly across the board.

4.5 Chapter Summary

This chapter discussed the research methodology and methods adopted in this study. On the methodology aspect, the process via which this study was conducted has been delineated; in this regard, the assumptions underpinning this study have been discussed thoroughly. For example, the study adopts a cautious realist approach and a falcificationist approach in its ontological and epistemological assumptions respectively.

Similarly, a functionalist research paradigm that is in line with the aforementioned philosophical assumptions is adopted. The functionalist research paradigm falls within the objectivist dimension and the sociology of regulation of the Burrell and Morgan's model. This paradigm is also in line with what Chua emphasised in her model and the Hopper and Powell's taxonomy of accounting research.

Similarly, this chapter discussed the research methods adopted in this study. In particular this study adopts a quantitative research approach in the process of collecting and analysing the most important aspect of this study, which is 'data'. The quantitative approach is in line with both the philosophical assumptions and research paradigm adopted in this study. In this regard, a quantitative secondary data were collected and analysed for the purpose of investigating the effect of Government control on the performance of upstream oil and gas companies operating in Nigeria. Moreover, the panel dataset were analysed using a multivariate regression analysis.

CHAPTER FIVE: DATA PRESENTATION AND ANALYSIS

CHAPTER FIVE: DATA PRESENTATION AND ANALYSIS

5.1 Introduction

This chapter presents the dataset used in this study, the statistical tools and econometric models used in analysing the data. First of all, statistical tests were conducted in order to determine the appropriateness of the methods of analysis used; these tests include Bartlett's test for equal variance, F-test for joint significance of the independent variables used in our models, Hausman test for deciding between fixed-effects vs random-effects models, Breusch and Pagan Lagrangian multiplier test for random-effects, Wilcoxon signedrank test and Wilcoxon sign test.

There are three parts to the analysis conducted in this chapter, the first part focuses on the effect of Government ownership, and a model was developed in order to examine the production efficiency of the upstream oil and gas JVCs operating alongside non-JVCs. The second part focuses on the effect of Government ownership on companies' gross margin. Similarly, a model was developed in order to examine the gross margin of such companies. Lastly, the third part focuses on the effect of alternative funding arrangement on the various performance measures considered in our previous models.

5.2 Dataset

Although data on crude oil production, oil price, and royalty payments are available on a monthly basis, data on OPEX are on annual basis. Consequently, the OPEX annual data were converted to a monthly data based on output. In order to apportion the OPEX data appropriately, the natural gas produced was converted to oil equivalent based on "... a general approximation that one barrel of oil contains six times as much energy as does one thousand cubic feet (mcf) of gas" (Jennings *et al.,* 2000, p. 422). Therefore, the cost of producing a barrel of oil was appropriately ascertained using this method.

5.2.1 Variables Defined

5.2.1.1 Crude oil production

This is the quantity of oil produced and this is represented by the term output as used in the model. Quantity of oil produced by all the upstream oil and gas companies in the sample was obtained from the NNPC ASB for the period 1999 to 2007 on a monthly basis. The quantity of crude oil produced is assumed to be negatively associated with the production cost per barrel of oil produced due to economies of scale theory. Therefore, the higher the volume of oil produced the lower the cost per barrel of oil produced will be.

On the other hand, the quantity of oil produced is assumed to be positively associated with both the companies' gross margin and Government take (royalty and petroleum profit tax). In this regard, companies will strive much harder to produce as much as they can in order to reduce the cost of production and increase their gross margin.

5.2.1.2 Operating expenditure

This is the operating expenditure incurred for the production of oil, which is represented by the term opex in our models. This refers to the summation of the expenses incurred during the exploration and production activities of the upstream oil and gas companies. The constituents of the opex include the followings:

- Direct transportation expenses (crude oil transportation)
- Expenses on maintenance of exploration and production facilities
- Insurance premium
- Security expenses
- Expenses incurred on the community where the exploration and production activities take place
- Expenses on health safety and environment (HSE)
- G & A (Salaries and Allowance) and
- Production cost

5.2.1.3 Oil price

This is the average price of crude oil per barrel of oil as per NNPC records. Although the price of oil is subject to the forces of demand and supply in the international market, but this study relies on the record of oil price provided by the NNPC (see Appendix 14).

5.2.1.4 Royalty payments

These are the payments of royalties made to the relevant Government agency (DPR) by the upstream oil and gas companies. The payments of royalty depends on whether the production is onshore or offshore and the charges are made at well-head. This variable is represented by the term royalty in our models (see Appendix 14).

5.2.1.5 Petroleum Profit Tax (PPT)

This is the tax payment made to the relevant Government agency (FIRS) by the upstream oil and gas companies; this is represented by the term PPT in our models (see Appendix 14).

5.2.1.6 Government Take per Barrel of Oil

In the context of this study, Government take refers to the summation of royalty payments and the petroleum profit tax as payments to Government by the upstream oil and gas companies. Therefore, Government take per Barrel of oil produced is the summation of Government take by the quantity of crude oil produced (see Appendix 14).

5.2.1.7 Cost per Barrel of Oil Produced

This refers to the actual cost per barrel of oil produced. This is obtained by dividing the production cost by the total crude oil produced. Find below the cost per barrel of oil across all the upstream oil and gas companies over the period: 1999 – 2007, (see Appendix 14).

5.2.1.8 Gross margin per Barrel of Oil Produced

This represents the profit margin on each barrel of oil sold by the upstream oil and gas companies (see Appendix 14).

5.2.1.9 Ownership

This is a dummy variable representing the ownership types of the companies; 1 represents the joint venture companies (JVCs) and 0 represents the non-joint venture companies (non-JVCs) (see Appendix 14).

5.2.1.10 Alternative Funding

This is also a dummy variable representing the period of alternative funding (AF) arrangements, with the value of 1 post-AF period and 0 pre-AF period.

5.2.1.11 Drilling Activities

These are the drilling activities of the upstream oil and gas companies that include both the exploration and development activities during the period of the study (1999-2007) (see Appendix 15).

5.3 Cost Efficiency

This section investigates the effect of Government ownership on cost efficiency of the upstream oil and gas JVCs operating in Nigeria alongside the non-JVCs. The ownership type takes the value 1 if the company is a JVC and the value 0 for non-JVCs (see Appendix 14). Ownership is interacted with the independent variables so as to see its effect on such variables.

We now present our models below after the relevant diagnostic tests were conducted (see Appendices 4 and 5): Find below the model we estimated:

$$lcostbbl_{it} = \alpha + \beta_1 loutput_{it} + \beta_2 lopex_{it} + \beta_3 lroyalty_{it} + \beta_4 own\_loutput_{it} + \beta_5 own\_lopex_{it} + \beta_6 own\_lroyalty_{it} + \varepsilon_i + \vartheta \quad (7)$$

Table 11 below provides us with interesting results on the parameters used in our cost efficiency model, below is a discussion on the overall, between and within variations.

Overall variation is the variation over time and between the companies involved, that is both the JVCs and the non-JVCs. Find below the formula for determining the overall variation:

$$S_O^2 = \frac{1}{N-1} \Sigma_i \Sigma_t (x_{it} - \bar{x})^2$$

The overall variation can be decomposed as follows:

$$S_O^2 \approx S_B^2 + S_W^2$$

Using the above formula, we will be able to determine the overall variations both within and between companies.

5.3.1 Descriptive Statistics on Cost Efficiency

Table 11: Overall, Between and Within Variations

Variable		Mean	Std. Dev.	Min	Max	Observations	
Id	Overall	5	2.583318	1	9	N =	972
	Between		2.738613	1	9	n =	9
	Within		0	5	5	T =	108
Month	Overall	521.5	31.19163	468	575	N =	972
	Between		0	521.5	521.5	n =	9
	Within		31.19163	468	575	T =	108
Costbbl	Overall	18.44764	89.50728	0	1993.01	N =	972
	Between		10.29532	6.142942	36.87675	n =	9
	Within		88.97887	-18.4291	1988.908	T =	108
Output	Overall	7122288	1.31E+07	0	3.23E+08	N =	972
	Between		8532307	11281.55	2.22E+07	n =	9
	Within		1.04E+07	-1.50E+07	3.11E+08	T =	108
Opex	Overall	2.00E+07	2.80E+07	0	6.17E+08	N =	972
	Between		1.90E+07	411350.4	5.48E+07	n =	9
	Within		2.15E+07	-3.49E+07	5.98E+08	T =	108
Royalty	Overall	1.45E+07	2.02E+07	0	9.83E+07	N =	972
	Between		1.41E+07	0	3.88E+07	n =	9
	Within		1.52E+07	-2.43E+07	7.40E+07	T =	108
Own_output	Overall	6931084	1.32E+07	0	3.23E+08	N =	972
	Between		8699029	0	2.22E+07	n =	9
	Within		1.04E+07	-1.52E+07	3.11E+08	T =	108
Own_opex	Overall	1.75E+07	2.91E+07	0	6.17E+08	N =	972
	Between		2.11E+07	0	5.48E+07	n =	9
	Within		2.12E+07	-3.73E+07	5.96E+08	T =	108
Own_royalty	Overall	1.35E+07	2.06E+07	0	9.83E+07	N =	972
	Between		1.50E+07	0	3.88E+07	n =	9
	Within		1.50E+07	-2.52E+07	7.31E+07	T =	108

However, it is important to note that the aim of this analysis is not only about the overall mean and the standard deviation for the overall variation over time and between companies, but to break it down to the level of between and within variation.

Between variation is the variation between the companies involved. Here, the variation accounts for changes in our parameters between companies, taking into consideration the companies distinctive characteristics but not focusing on how it changes over time. Find below the formula for determining the between variation:

$$S_B^2 = \frac{1}{N-1} \sum_i (\bar{x}_i - \bar{x})^2$$

Using the above formula, we will be able to determine the variation between the companies in our sample. In this case, the aim is to find out the extent to which the parameters used in our models differ between companies.

On the other hand, within variation is the variation within the companies involved over time; that is how the respective parameters change over time. Find below the formula for determining the within variation:

$$S_W^2 = \frac{1}{N-1} \sum_i \sum_t (x_{it} - \bar{x}_i)^2 = \frac{1}{N-1} \sum_i \sum_t (x_{it} - \bar{x}_i + \bar{x})^2$$

Using the formula above, we can determine the extent to which the parameters used in our models differ within companies over time.

We now consider the variations (both between and within) for each of the parameters used in our production efficiency model so as to understand how they vary between and within companies and the extent to which such variations affect the dependent variable (production efficiency). From our production efficiency model, we can see that the time-invariant regressor id (ownership) model does not vary over time, hence the within variation is 0. On the other hand, the individual-invariant regressor (month) does not vary between individual companies; hence the between variation is 0 because it does not vary with the ownership type of the companies.

On the dependent variable in our model, the production efficiency (costbbl), we have less between variations (10.29532) than within variation (88.97887). This indicates that a fixed-effects model may be appropriate in this context, because as Torres-Reyna (2014, p. 10) states that, "fixed-effects will not work well with data for which within-cluster variation is minimal..." This indicates that ownership type is instrumental on the performance of the companies being studied. Therefore, there is the need to control for the ownership type of companies in our model. Similarly, we can see that all the regressors in our model have more within than between variation.

Additionally, we can see a huge difference between the minimum and the maximum cost per barrel of oil produced. The overall minimum cost per barrel is zero and the maximum is $1993.01. Considering the between variation, the minimum cost per barrel is $6.14294 and the maximum is $36.87675. On the other hand, the within variation differs significantly, with a minimum of $-18.42911 and a maximum of $1988.908. This clearly indicates that, companies' distinctiveness accounts for such variation. It is important to state here that, such companies' differences emerge when their mean value is deducted from the overall mean.

More so, it is important to distinguish the effect of ownership from other factors such as royalty payments, quantity of oil produced and the operating expenditure. Table 13 below presents Bartlett's test for equal variances on the sampled companies based on their ownership type; that is the JVCs (=1) and the non-JVCs (=0). We tested the following hypothesis:

Hypothesis $_{7.0}$: Joint Venture Companies are not more efficient than the non-Joint Venture Companies

Analysis of variance was first conducted in order to decide whether the variances assumed are equal or not (see Table 12 below). The essence of doing this is to find out whether or not sampling distributions of the two groups have similar or different standard errors, because the difference (if any) between the two sample variances is one out of many possible differences. The test for equality variances used is as follows:

$$F = S_1^2 / S_2^2$$

This means that the ratio of variances has F-distribution with the denominator degrees of freedom calculated as in n1 – 1 and the numerator degrees of freedom calculated as n2 – 1. So, the following null hypothesis was tested, which states that the variances between the two groups are the same:

$$H_0: \sigma_1{}^1 = \sigma_2{}^2$$

$$H_1: \sigma_1{}^1 \neq \sigma_2{}^2$$

5.3.2 Bartlett's test for equal variances

Table 12: Bartlett's test for equal variances

ownership type (1=JVCs, 0=non-JVCs)	Summary of cost per barrel of oil produced Mean
0	25.366283
1	12.912724
Total	18.447639

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	37221.8707	1	37221.8707	4.66	0.0311
Within groups	7741996.02	970	7981.4392		
Total	7779217.89	971	8011.55293		

From the results obtained in Table 12 above, (F = 4.66, P-value = 0.0311) we can reject the null hypothesis $H_0: \sigma_1{}^1 = \sigma_2{}^2$ and accept that there are differences between the two group of companies, that is $H_1: \sigma_1{}^1 \neq \sigma_2{}^2$. In essence, non-JVCs spend twice as much as the JVCs in producing a barrel of oil. Therefore, based on our findings here, we can conclude that the JVCs are more efficient than the non-JVCs.

We now consider the extent to which production cost per barrel is affected by other factors such as the quantity of crude oil produced (loutput), operating expenditure (lopex), royalty payments (lroyalty), and Government ownership (ownership).

First of all, F-test for joint significance of the independent variables was conducted and the following results were obtained with F = 654.34 and P-value = 0.0000.

5.3.3 F test for Joint Significance of Independent Variables

Table 13: F test for Joint Significance of Variables

```
( 1)  loutput = 0
( 2)  lopex = 0
( 3)  lroyalty = 0
( 4)  own_loutput = 0
( 5)  own_lopex = 0
( 6)  own_lroyalty = 0

      F(  6,    720) =  654.34
           Prob > F =    0.0000
```

The essence of conducting the F test is to ascertain which of the variables to be included and which ones to be excluded. Therefore, we tested whether at the same time the coefficients are all equal to zero. The results provided us with the evidence that we can reject the null hypothesis which postulates that at the same time these variables are all equal to zero; hence, our decision to include all the variables in our model. We now present our regression results on production efficiency (lcostbbl), see Table 14 below.

5.3.4 Regression Results on Cost Efficiency

Table 14: *Regression Results on Production Efficiency (lcostbbl)*

	OLS Estimator		***Fixed-effects Estimator***		***Random-effects Estimator***	
Variables	*Coeff.*	*t-test*	*Coeff.*	*t-test*	*Coeff.*	*z-test*
loutput	-0.9984	-96.02*** (0.000)	-1.00917	-28.39*** (0.000)	-9.9994	-32.11*** (0.0000)
lopex	1.0151	78.98*** (0.000)	1.01793	28.57*** (0.000)	1.0163	32.85*** (0.0000)
lroyalty	0.0343	22.83*** (0.000)	0.03359	4.25*** (0.003)	0.0344	11.33*** (0.000)
own_loutput	0.1998	2.40*** (0.017)	0.21575	0.93 (0.378)	0.2035	1.22 (0.223)
own_lopex	-0.2694	-4.14*** (0.000)	-0.26231	-1.18 (0.273)	-0.2723	-1.75 (0.079)
own_lroyalty	0.0913	4.69*** (0.000)	0.09829	5.29*** (0.001)	0.0909	9.74*** (0.000)
_cons	-0.2426	-2.18** (0.029)	-0.39486	-1.43 (0.191)	-0.2493	-1.79 (0.073)
N		972		972		972
F-test		4901.64		162.64		6331.84
R-Sq/Wald		0.8586		0.8225		0.8225

Note: *, ** indicate significance at 1% and 5% respectively**

After series of diagnostic tests (see the Appendices), we can adopt the OLS model to explain our results. Our OLS model, with an R-sq. of 0.8586, explains quite a lot about the cost efficiency of the upstream oil and gas companies operating in Nigeria. Crude oil production (output) with a coefficient of -0.9984 has a negative relationship with the cost per barrel of oil produced. That is production cost reduces with every increase of a barrel of oil produced. This is in line with the economies of scale theory, that companies take advantage of cost reduction due to their size (throughput). This relationship is found to be significant at 1% (*P*-value < 0.05 = 0.000). This indicates that for every additional barrel of oil produced there is a reduction in the production cost by 1.01%. However, Government ownership is slightly significant (*P*-value = 0.017) on the quantity of crude oil produced (loutput) by the companies and in turn does not reduce cost (-0.9984 + 0.1998 = -0.7986).

On the other hand, operating expenditure (lopex) has a positive (1.0151) and significant (P-value < 0.05 = 0.000) effect on production cost. This indicates that an increase in operating expenditure by one dollar increases cost of production by 1.02% for the non-JVCs. On the other hand, the JVCs spend less than the non-JVCs per barrel of oil produced 0.7457 (1.0151 + -0.2694). Therefore, an increase in operating expenditure by the JVCs increases the cost per barrel by 0.75% unlike in the case of the non-JVCs where the cost per barrel increases by 1.02%.

Spending patterns by the upstream oil and gas companies and the control mechanisms put in place to monitor such patterns greatly contribute to how much is spent per barrel of oil produced. Consequently, the operating expenditure in the upstream oil and gas operations proves to be one of the contentious areas. In this context, the agency theory issue becomes useful in explaining the need for enhanced monitoring mechanisms in the upstream operations. Therefore, government ownership proves to be effective as a control mechanism as argued by Eisenhardt (1989). At this juncture, we can reject the null hypothesis below:

> *Hypothesis $_{7.0}$: Joint Venture Companies are not more efficient than the non-Joint Venture Companies*

Therefore, it can be argued that the higher cost per barrel of oil produced by the non-JVCs is due to the problem of information asymmetry because government may not effectively confirm whether the inputs of the upstream oil and gas companies are the best chosen for the output. Hence, we can reject the null hypothesis and accept that government ownership in the JVCs has a significant and systematic effect of the companies' production efficiency.

Consequently, one major policy implication of this result is that government ownership in the upstream oil and gas sector needs to be consolidated and the benefit of such consolidation needs to be fully exploited just as in the case of Saudi Aramco where government ownership started from 24% ownership in 1973 to a 100% government ownership in 1980 (Inkpen and Moffett, 2011). To date, Saudi Aramco is the largest and the most profitable oil and gas company in the world. In this regard and based on the results, that government ownership enhances the efficiency of the upstream oil and gas companies in Nigeria, the Nigerian government needs to increase and consolidate its ownership in the upstream sector.

Similarly, royalty payment (royalty) has a positive and significant effect on the production cost per barrel of oil, with a coefficient of 0.0343 (P-value < 0.05 = 0.000). However, we can see here that the JVCs pay more royalty 0.1256 (0.0343 + 0.0913) than the non-JVCs (0.0343). This may be attributed to the disparity in the different royalty rates paid by the upstream oil and gas companies based on their area of operations. Overall, we can see that Government ownership has a significant effect (P-value < 0.05) on the production cost per barrel of oil produced by the JVCs.

Another interesting aspect of this model is the rho that is very high (0.92064221). Rho is the interclass correlation of the error term due to companies' ownership effect. It approaches 1 if the companies' ownership effect dominates the error term. Find below the formula for calculating the rho:

$$rho = \frac{(Sigma\_u)^2}{(Sigma\_u)^2 + (Sigma\_e)^2}$$

Where:

$Sigma\_u$ = SD of residuals within groups u_i

$Sigma\_e$ = SD of residuals (overall error term) e_i

Based on our assumption, the rho will be high because companies' ownership is hypothesised to have effect on their productive efficiency. Having a rho of 0.92064221 indicates that 92% of the variance in our model is due to ownership differences across companies. Therefore, the rho affirms our assumption on government ownership effect on the production efficiency of the upstream oil and gas companies operating in Nigeria.

In summary, the results obtained from our analysis are in line with the assumptions of agency theory, that agent performs differently based on its ownership right on asset. Considering the assumption that agent's ownership right on asset influences the agent's actions ex-ante, it can be argued that the JVCs have an optimal incentive-system in such a way that the IOCs ownership in the oil resources mitigates the potentials for adverse selection and moral hazard problems. Similarly, Government ownership in the JVCs provides it with the majority representation on the management boards of such companies, which is an effective control mechanism towards ensuring efficiency in operations.

However, under the non-JVCs (PSC for example), Government control is only limited to vetting of the work programs to be undertaken by the upstream oil and gas companies, with no voting right on the management boards of such companies. Since the companies have to recoup their total costs before any profit is shared between them and the Government, the argument here is that such companies may not be as efficient as companies where Government has a majority stake and controls substantial aspect of the operations. This is in line with the assumption of separation of ownership and control expounded in our theoretical framework under agency theory.

We now move on to address the second question of this study, which is the effect of Government ownership on the profitability (gross margin) of the upstream oil and gas companies, an issue discussed in the next section.

5.4 Gross Margin

This section discusses the effect of Government ownership on the profitability of the upstream oil and gas companies operating in Nigeria.

5.4.1 Descriptive Statistics on Gross Margin

Table 15: Overall, Between and Within Variations

Variable		Mean	Std. Dev.	Min	Max	Observations	
id	overall	5	2.583318	1	9	N =	972
	between		2.738613	1	9	n =	9
	within		0	5	5	T =	108
month	overall	521.5	31.19163	468	575	N =	972
	between		0	521.5	521.5	n =	9
	within		31.19163	468	575	T =	108
oilprice	overall	37.45995	18.26724	0	74.2877	N =	972
	between		0	37.45995	37.45995	n =	9
	within		18.26724	-7.11e-15	74.2877	T =	108
grossm~n	overall	40.6569	350.7065	-7805.633	97.42076	N =	972
	between		32.44374	-2.832116	79.87539	n =	9
	within		349.3686	-7776.013	123.5435	T =	108
output	overall	7122288	1.31e+07	0	3.23e+08	N =	972
	between		8532307	11281.55	2.22e+07	n =	9
	within		1.04e+07	-1.50e+07	3.11e+08	T =	108
opex	overall	2.00e+07	2.80e+07	0	6.17e+08	N =	972
	between		1.90e+07	411350.4	5.48e+07	n =	9
	within		2.15e+07	-3.49e+07	5.98e+08	T =	108
royalty	overall	1.45e+07	2.02e+07	0	9.83e+07	N =	972
	between		1.41e+07	0	3.88e+07	n =	9
	within		1.52e+07	-2.43e+07	7.40e+07	T =	108
ppt	overall	3.22e+07	5.56e+07	0	2.98e+08	N =	972
	between		3.17e+07	0	8.36e+07	n =	9
	within		4.69e+07	-5.14e+07	2.87e+08	T =	108
own_ou~t	overall	6931084	1.32e+07	0	3.23e+08	N =	972
	between		8699029	0	2.22e+07	n =	9
	within		1.04e+07	-1.52e+07	3.11e+08	T =	108
own_opex	overall	1.75e+07	2.91e+07	0	6.17e+08	N =	972
	between		2.11e+07	0	5.48e+07	n =	9
	within		2.12e+07	-3.73e+07	5.96e+08	T =	108
own_ro~y	overall	1.35e+07	2.06e+07	0	9.83e+07	N =	972
	between		1.50e+07	0	3.88e+07	n =	9
	within		1.50e+07	-2.52e+07	7.31e+07	T =	108
own_ppt	overall	3.02e+07	5.63e+07	0	2.98e+08	N =	972
	between		3.34e+07	0	8.36e+07	n =	9
	within		4.66e+07	-5.34e+07	2.85e+08	T =	108

Table 15 above provides us with interesting statistics on the parameters used in our gross margin model, below is a discussion on the overall, between and within variations.

We now consider the variations (both between and within) for each of the parameters used in our gross margin model so as to understand how they vary between and within companies and the extent to which such variations affect the dependent variable (gross margin). From our gross margin model, we can see that the time-invariant regressor id (ownership) model does not vary over time, hence the within variation is 0. On the other hand, the individual-invariant regressor (oil price) does not vary between individual companies; hence the between variation is 0 because it does not vary with the ownership type of the companies.

On the dependent variable in our model, the gross margin (lgrossmargin), we have less between variations (32.44) than within variation (349.36). This indicates that a fixed-effects model may be appropriate in this context as well, just as it is applied in the production efficiency model above. Similarly, we can see that all the regressors in our model have more within than between variation. This indicates that the variations within companies have more influence on the companies' gross margin than the variations between them.

More so, we can see that there is a huge difference between the minimum and the maximum gross margin per barrel of oil produced. Looking at the between variation, the minimum gross margin per barrel is \$-2.83 and the maximum is \$79.87.

5.4.2 Regression Results on Gross Margin

Below is the model we estimate on the gross margin:

$$\begin{aligned} &lgrossmargin_{it} \\ &= \alpha + \beta_1 loutput_{it} + \beta_2 lopex_{it} + \beta_3 lroyalty_{it} + \beta_4 lppt_{it} + \beta_5 own\_loutput_{it} \\ &+ \beta_6 own\_lopex_{it} + \beta_7 own\_lroyalty_{it} + \beta_8 own\_lppt_{it} + \beta_9 loilprice_t + \varepsilon_i \\ &+ \vartheta_{it} \end{aligned} \tag{8}$$

Table 16: Regression results on Gross Margin (lgrossmargin)

Regression Results on Gross Margin (lgrossmargin)

Variables	*OLS Estimator*		*Fixed-effects Estimator*		*Random-effects Estimator*	
	Coeff.	*t-test*	*Coeff.*	*t-test*	*Coeff.*	*z-test*
Loutput	1.4434	28.20*** (0.000)	1.6992	8.44*** (0.000)	1.4434	9.85*** (0.000)
Lopex	-1.0423	-22.60*** (0.000)	-1.2243	-6.99*** (0.000)	-1.0423	-8.00*** (0.000)
lroyalty	-0.0437	-2.92*** (0.004)	-0.0768	-7.44*** (0.000)	-0.0437	-2.20 (0.028)
Lppt	-0.0364	-2.57*** (0.000)	-0.0129	-0.49 (0.636)	-0.0364	-1.87 (0.061)
Loilprice	0.5879	8.16*** (0.000)	0.5822	5.75*** (0.000)	0.5879	7.82*** (0.000)
own_loutput	-0.9452	-11.96*** (0.000)	-1.1374	-5.11*** (0.001)	-0.9452	-5.23*** (0.000)
own_lopex	0.7593	12.02*** (0.000)	0.9228	4.59*** (0.002)	0.7592	5.08*** (0.000)
own_lroyalty	0.1105	3.74*** (0.000)	0.1472	4.80 (0.001)	0.1105	3.61*** (0.000)
own_lppt	-0.0404	-1.82 (0.070)	-0.0539	-1.66 (0.135)	-0.0404	-1.73 (0.084)
_cons	-0.7546	-2.33 (0.020)	-1.4120	-2.05 (0.075)	-0.7546	-1.20 (0.229)
N	972		972		972	
F-test	155.94		0.0000		0.0000	
R-Sq	0.6820		0.6717		0.6820	

On the other hand, the within variation differs significantly, with a minimum of $-7776 (this indicates a loss) and a maximum of $123. Similarly, this clearly indicates that, companies' distinctiveness accounts for such variation in their gross margin.

The model investigates the extent to which companies' profitability (lgrossmargin) varies between the two groups of companies. Our null hypothesis is that ownership does affect companies' profitability. The r^2 of our model is quite strong (0.68) with an F value 155.94. This indicates that 68% of variability in the companies' gross margin is explained by our model.

Crude oil production (loutput) is positively correlated with companies' profitability and the variable is significant at 1% level (P-value < 0.01). Similarly, oil price (loilprice) is positively correlated with companies' profitability and the variable is significant at 1% level (P-value < 0.01).

On the other hand, operating expenditure (lopex), royalty payments (lroyalty), petroleum profit tax (lppt) are negatively correlated with companies' gross margin. However, only operating expenditure is significant at 1 % level (P-value < 0.01). Royalty payments and petroleum profit tax are not significant in explaining the gross margin of the upstream oil and gas companies.

Overall, our model indicates that Government ownership is positively associated with operating expenditure (0.75) and the variable is significant at 1 % level (P-value < 0.01), unlike the association obtains with no

Government intervention (-1.04). This indicates that Government ownership improves companies' gross margin. Therefore, we can reject the null hypothesis below:

> *Hypothesis $_{8.0}$: Joint Venture Companies are not more profitable than the non-Joint Venture Companies*

Based on the findings above, Government needs to review the royalty rates in such a way that it will be much more favourable to the non-JVCs, as it was done in the UK in 2003 when royalty was abolished for all fields so as to retain investors due to maturing fields in the North Sea (Alalade, 2004). Although it is quite a different situation in Nigeria because of the prosperous nature of oil fields in the country, the need for such review needs to be taken seriously because of the large scale divestment the country started witnessing recently.

This is particularly important because harsh fiscal terms tend to negatively affect the investors in terms of postponement of field development and premature field abandonment (Kemp and Rose, 1981). However, with the current proposal by the Petroleum Industry Bill (PIB) that is awaiting approval of the legislative arm of Government, it can be argued that such trend may be reversed as it proposes 50% tax rate for the onshore and shallow oil fields and the 20% tax rate for the deep water oil fields, as against the current 85% and 50% respectively.

5.5 Alternative Funding

This sub-section focuses on the effect of alternative funding (AF) arrangement on the performance of the upstream oil and gas companies on one hand and Government revenue on the other. In order to test for the effect of AF on the aforementioned parameters, Wilcoxon matched-pairs sign rank test and test equality of matched pairs were conducted.

The sign rank test the equality of matched pairs of observations. Wilcoxon signed-rank test is a test of the hypothesis that two distributions of a particular observation (variable) are the same, which is expressed as $x_1 \sim x_2$ (Wilcoxon, 1945). This nonparametric test is used in order to investigate the extent of differences between the matched groups, which is the pre-AF period vs. post-AF period.

In the context of our study, the essence of these tests is to test the effectiveness of the AF arrangement that was introduced in 2003 (see the literature review chapter for a detailed discussion on the AF arrangements). Consequently, the following hypotheses were tested:

> *Hypothesis $_{1.0}$: Gross margin is not significantly higher in the post-alternative funding period*
>
> *Hypothesis $_{2.0}$: Crude oil production is not significantly higher in the post-alternative funding period*
>
> *Hypothesis $_{3.0}$: Government take is not significantly higher in the post-alternative funding period*
>
> *Hypothesis $_{4.0}$: Capital expenditure is not significantly higher in the post-alternative funding period*

Hypothesis $_{5.0}$: Exploration activities are not significantly higher in the post-alternative funding period

Hypothesis $_{6.0}$: Development activities are not significantly higher in the post-alternative funding period

5.5.1 Pre-Alternative Funding vs. Post-Alternative Funding Performance Analysis

In order to test the above hypotheses, two sets of variables were compared, that before the alternative funding was introduced (Pre-AF period: 1999 - 2002) and that after the alternative funding was introduced (Post-AF period: 2003 - 2007). Find the test results in Table 17 below:

Table 17: Wilcoxon Test Statistics on Alternative Funding

	GovtTake	Capex	Opex	Output	Grossmargin	Explowells	Devwells
Mann-Whitney U	34353.000	13056.000	24473.000	35045.000	21963.000	233.500	230.500
Wilcoxon W	63273.000	41976.000	53393.000	80195.000	50883.000	558.500	440.500
Z	-.914	-12.738	-6.398	-.530	-7.791	-.408	-.449
Asymp. Sig. (2-tailed)	.361	.000	.000	.596	.000	.683	.653

a. Grouping Variable: AF

For each of the performance variables analysed, means and medians of the Pre-AF (-48 to -1) and Post-AF (+1 to +60) are presented in Table 18 below. Additionally, a Wilcoxon signed-rank test was employed to test whether or not the median difference in the respective variables are zero.

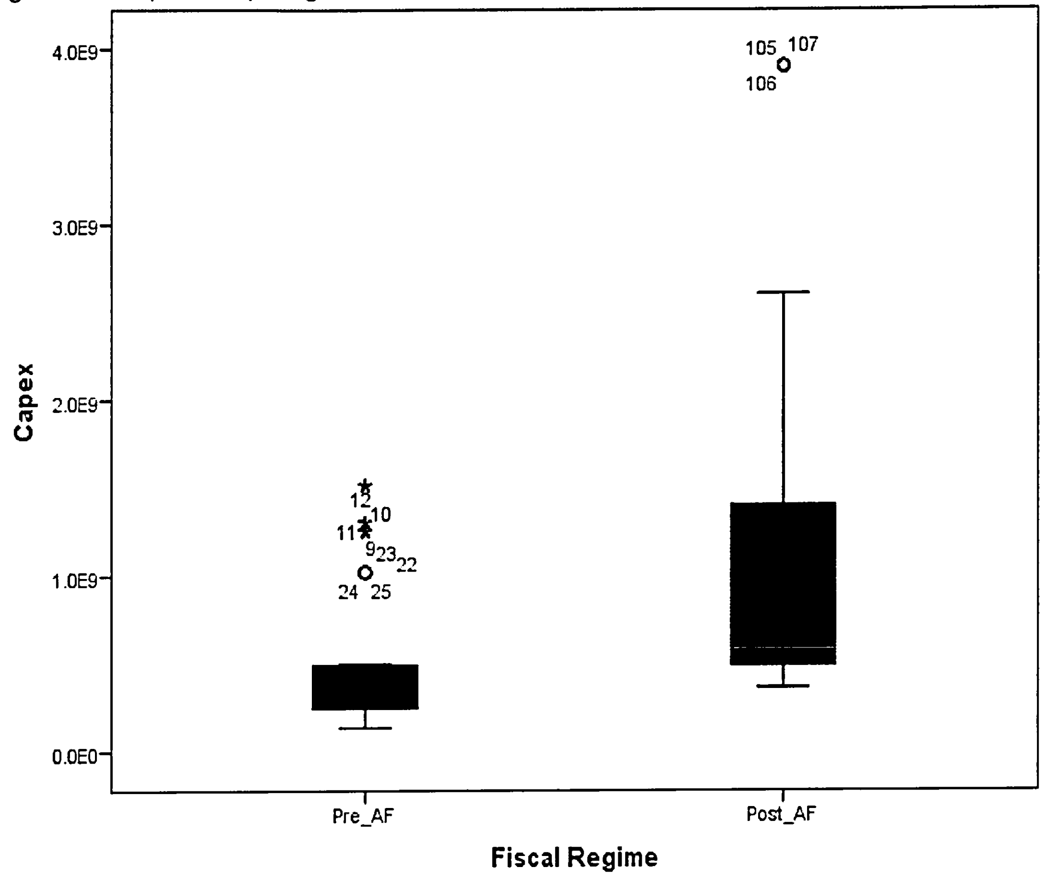
Table 18: Results of univariate tests

Variable	Obs	Mean (Median) Pre_AF	Mean (Median) Post_AF	Mean (Median) Changes	z-statistic (Asymp. Sig. 2-tailed)	% of change
		108 months Means (Medians): -48 to -1 vs. +1 to +60				
GovtTake	540	58488441.67 (47519000)	94798555.49 (54726500)	36310113.82 (7207500)	-0.914 (0.361)	62 (15)
Capex	540	515283333.33 (398500000)	1162080000 (1100000000)	646796666.67 (701500000)	-12.738 (0.000)	126 (176)
Opex	540	23370669.13 (25531589.92)	38019113.03 (37118448.77)	14648443.90 (11586858.85)	-6.398 (0.000)	63 (45)
Output	540	12048142.16 (12695695.5)	12818198.27 (10074813.5)	770056.11 (-2620882)	-0.53 (-0.530)	6 (-21)
Grosmargin	540	243138292.49 (212462288.4)	547685360.64 (419356447.1)	304547068.15 (206894158.7)	-7.791 (0.000)	125 (97)
Explowells	45	1.40 (1)	0.84 (0)	-0.56 (-1)	-0.408 (0.683)	-40 (-100)
Devwells	45	15.15 (12)	15.04 (18)	-0.11 (6)	-0.449 (0.653)	-0.7 (50)

5.5.1.1 Capital Expenditure (Capex)

Table 18 above indicates that capital expenditure significantly increased in the Post-AF period (mean value +126% and median value +176%). This clearly indicates that the upstream oil and gas companies increased their capital expenditures due to the new funding arrangements. Find below a box plot presenting a pictorial change in the capital expenditures:

Figure 2: Box plot comparing Pre-AF vs. Post-AF on Capital expenditure



From the box plot above, we can see that there is more variability in the post alternative funding period. This is evidenced by the significant changes in capital expenditures by the upstream oil and gas companies in the Post-AF period (see Table 19 below).

Table 19: Pre-AF vs. Post-AF Descriptives on Capital Expenditures

AF				Statistic	Std. Error
Capex	Pre_AF	Mean		515283333.33	25640634.406
		95% Confidence Interval for Mean	Lower Bound	464772837.22	
			Upper Bound	565793829.44	
		5% Trimmed Mean		481148148.15	
		Median		398500000.00	
		Variance		1.578E+17	
		Std. Deviation		397223000.159	
		Minimum		135000000	
		Maximum		1510000000	
		Range		1375000000	
		Interquartile Range		258750000	
		Skewness		1.403	.157
		Kurtosis		.600	.313
	Post_AF	Mean		1162080000.00	49555808.666
		95% Confidence Interval for Mean	Lower Bound	1064557653.85	
			Upper Bound	1259602346.15	
		5% Trimmed Mean		1068355555.56	
		Median		1100000000.00	
		Variance		7.367E+17	
		Std. Deviation		858331784.203	
		Minimum		364000000	
		Maximum		3900000000	
		Range		3536000000	
		Interquartile Range		913000000	
		Skewness		1.519	.141
		Kurtosis		2.087	.281

For example, the minimum capital expenditures were $135,000,000 and $364,000,000 in the Pre-AF and Post-AF periods respectively and the maximum capital expenditures were $1,510,000,000 and $3,900,000,000 respectively.

Consequently, the median of capital expenditure in the Pre-AF period was $398, 500,000 but this was significantly increased in the Post-AF period to $1, 100,000,000. Similarly, the average capital expenditure in the Pre-AF was N515, 283,333 but it was increased to $1, 162,080,000. Additionally, below is the Wilcoxon sign test on the capital expenditures in the Pre-AF and Post-AF periods.

5.5.1.1.1 Wilcoxon Sign Test on Capital Expenditures

Table 20: Sign Test on Capital Expenditure (lcapex)

sign	observed	expected
positive	240	120
negative	0	120
zero	300	300
all	540	540

One-sided tests:

Ho: median of pre-AF_lcapex – post-AF_lcapex = 0 vs.

Ha: median of pre-AF_lcapex – post-AF_lcapex > 0

Pr(#positive >= 240) =

Binomial(n = 240, x >= 240, p = 0.5) = 0.0000

Ho: median of pre-AF_lcapex – post-AF_lcapex = 0 vs.

Ha: median of pre-AF_lcapex – post-AF_lcapex < 0

Pr(#negative >= 0) =

Binomial(n = 240, x >= 0, p = 0.5) = 1.0000

Two-sided test:

Ho: median of pre-AF_lcapex – post-AF_lcapex = 0 vs.

Ha: median of pre-AF_lcapex – post-AF_lcapex != 0

Pr(#positive >= 240 or #negative >= 240) =

min(1, 2*Binomial(n = 240, x >= 240, p = 0.5)) = 0.0000

Table 20 above indicates that there were 240 comparisons for which capital expenditure (lcapex) pre-AF period exceeded capital expenditure post-AF period, zero comparison for which capital expenditure post-AF period exceeded capital expenditure pre-AF period, and 300 comparisons for which they were the same.

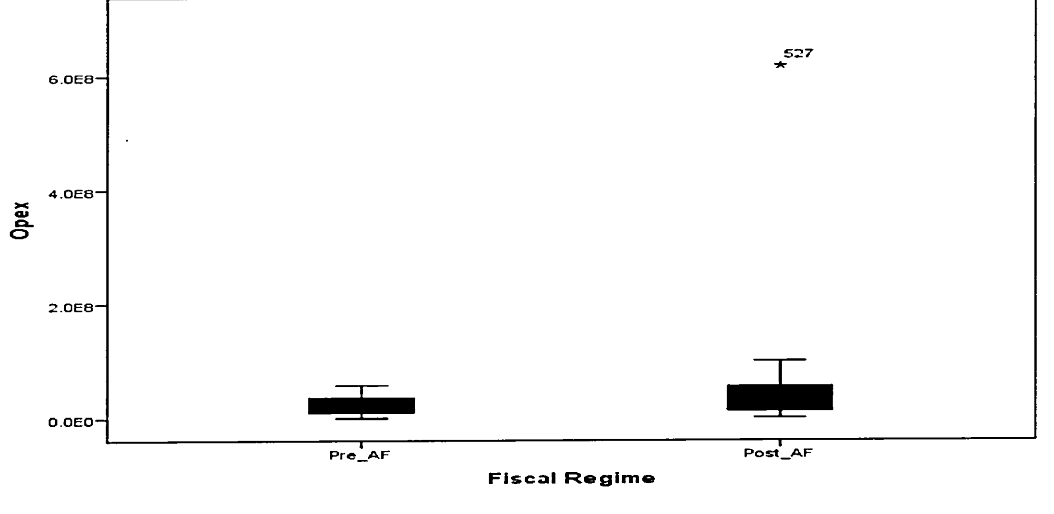
Based on the binomial distribution where the alternative hypothesis is that the median of post-AF_lcapex – pre-AF_lcapex > 0, the significance of the one-sided test is 1. Similarly, the significance of the two-sided test, where the alternative hypothesis is simply that the median of the differences is different from zero, is 0. Findings from the above tests indicate that alternative funding arrangement significantly increased capital expenditures made by the upstream oil and gas companies in the post-AF period. Therefore, we can now reject the null hypothesis below:

> *Hypothesis $_{5.0}$: Capital expenditure is not significantly higher in the post-alternative funding period*

5.5.1.2 Operating Expenditure (Opex)

Table 18 above indicates that operating expenditure increased in the Post-AF period (mean value +63% and median value +45%). This clearly indicates that the upstream oil and gas companies increased their operating expenditures due to the increased in their capital expenditures which in turn affects their operating activities. Find below a box plot presenting a pictorial change the operating expenditures:

Figure 3: Box plot comparing Pre-AF vs. Post-AF on Operating Expenditure



From the box plot above, we can see that there is more variability in the post alternative funding period. This is evidenced by changes in operating expenditures, see Table 21 below:

Table 21: Pre-AF vs. Post-AF Descriptive on Operating Expenditures

AF				Statistic	Std. Error
Opex	Pre_AF	Mean		23370669.13	961348.885
		95% Confidence Interval for Mean	Lower Bound	21476870.08	
			Upper Bound	25264468.18	
		5% Trimmed Mean		22924136.22	
		Median		25531589.92	
		Variance		2.218E+14	
		Std. Deviation		14893152.887	
		Minimum		26762	
		Maximum		57321899	
		Range		57295136	
		Interquartile Range		26968898	
		Skewness		.325	.157
		Kurtosis		-1.166	.313
	Post_AF	Mean		38019113.03	2360469.090
		95% Confidence Interval for Mean	Lower Bound	33373875.88	
			Upper Bound	42664350.19	
		5% Trimmed Mean		35593964.13	
		Median		37118448.77	
		Variance		1.672E+15	
		Std. Deviation		40884523.939	
		Minimum		0	
		Maximum		617469116	
		Range		617469116	
		Interquartile Range		43375387	
		Skewness		9.586	.141
		Kurtosis		134.870	.281

For example, the minimum operating expenditures were $26,762 and N0 in the Pre-AF and Post-AF periods respectively and the maximum operating expenditures were $57,321,899 and $617,469,116 respectively.

Consequently, the median of operating expenditure in the Pre-AF period was $25,531,589 but this was increased in the Post-AF period to $37,118,448.

5.5.1.2.1 Wilcoxon Sign Test on Operating Expenditure

Table 22: Sign Test on Operating Expenditure (lopex)

sign	observed	expected
positive	240	120
negative	0	120
zero	300	300
all	540	540

One-sided tests:

Ho: median of pre-AF_lopex – post-AF_lopex = 0 vs.

Ha: median of pre-AF_lopex – post-AF_lopex > 0

Pr(#positive >= 240) =

Binomial(n = 240, x >= 240, p = 0.5) = 0.0000

Ho: median of pre-AF_lopex – post-AF_lopex = 0 vs.

Ha: median of pre-AF_lopex – post-AF_lopex < 0

Pr(#negative >= 0) =

Binomial(n = 240, x >= 0, p = 0.5) = 1.0000

Two-sided test:

Ho: median of pre-AF_lopex – post-AF_lopex = 0 vs.

Ha: median of pre-AF_lopex – post-AF_lopex != 0

Pr(#positive >= 240 or #negative >= 240) =

min(1, 2*Binomial(n = 240, x >= 240, p = 0.5)) = 0.0000

Table 22 above indicates that there were 240 comparisons for which operating expenditure (lopex) pre-AF period exceeded operating expenditure post-AF period, zero comparison for which operating expenditure post-AF period exceeded operating expenditure pre-AF period, and 300 comparisons for which they were the same.

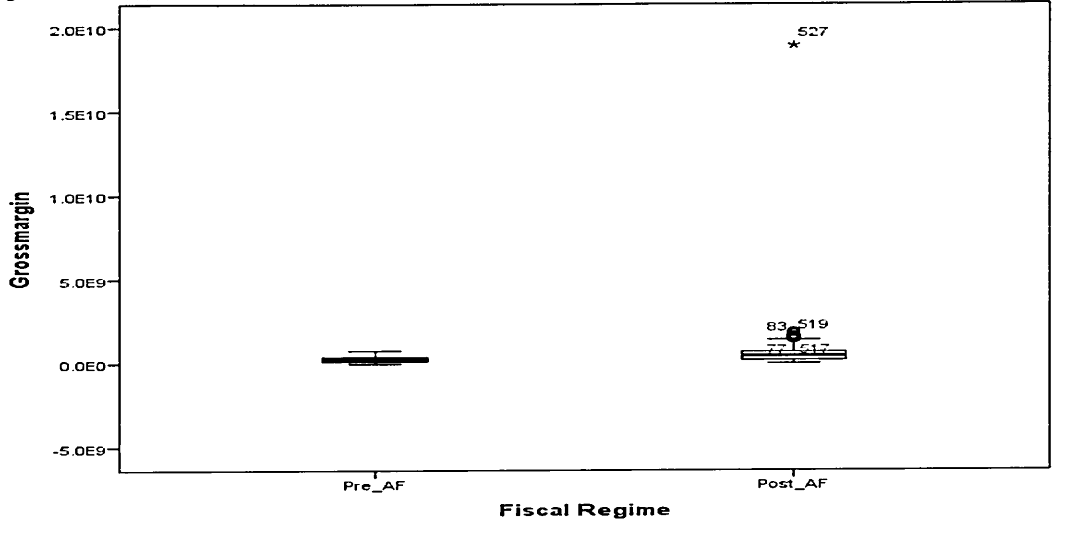
Based on the binomial distribution where the alternative hypothesis is that the median of post-AF_lopex – pre-AF_lopex > 0, the significance of the one-sided test is 1. Similarly, the significance of the two-sided test, where the alternative hypothesis is simply that the median of the differences is different from zero, is 0. Findings from the above tests indicate that alternative funding arrangement increased operating expenditures made by the upstream oil and gas companies in the post-AF period. Therefore, we cannot reject the view that operating expenditure is not significantly lower in the post-alternative funding period.

5.5.1.3 Gross Margin

Table 18 above indicates that companies' gross margin significantly increased in the Post-AF period (mean value +125% and median value

+97%). Find below a box plot presenting a pictorial change in the companies' gross margin:

Figure 4: Box plot comparing Pre-AF vs. Post-AF on Companies' Gross Margin



From the box plot above, we can see that there is more variability in the post alternative funding period. This is evidenced by changes in companies' gross margin, see Table 23 below:

Table 23: Pre-AF vs. Post-AF Descriptives on Companies' Gross Margin

AF				Statistic	Std. Error
Grossmargin	Pre_AF	Mean		243138292.49	11290010.393
		95% Confidence Interval for Mean	Lower Bound	220897656.13	
			Upper Bound	265378928.86	
		5% Trimmed Mean		233262214.62	
		Median		212462288.40	
		Variance		3.059E+16	
		Std. Deviation		174904088.924	
		Minimum		-41056181	
		Maximum		734852672	
		Range		775908853	
		Interquartile Range		276098012	
		Skewness		.690	.157
		Kurtosis		-.385	.313
	Post_AF	Mean		547685360.64	65557576.580
		95% Confidence Interval for Mean	Lower Bound	418672660.66	
			Upper Bound	676698060.62	
		5% Trimmed Mean		457496176.62	
		Median		419356447.10	
		Variance		1.289E+18	
		Std. Deviation		1135490534.570	
		Minimum		-35404588	
		Maximum		18916645303	
		Range		18952049891	
		Interquartile Range		491390802	
		Skewness		14.282	.141
		Kurtosis		230.716	.281

We can see from Table 23 above, the minimum gross margins/(losses) were ($41,056,181) and ($35,404,588) in the Pre-AF and Post-AF periods respectively and the maximum gross margins/(losses) were $734,852,672 and $18,916,645,303 respectively.

Consequently, the median of gross margin in the Pre-AF period was \$212,462,288 but this was increased in the Post-AF period to \$419,356,447.

5.5.1.3.1 Wilcoxon Sign Test on Gross Margin

Table 24: Sign Test on Gross Margin (lgrossmargin)

sign	observed	expected
positive	237	118.5
negative	0	118.5
zero	303	303
all	540	540

One-sided tests:

Ho: median of pre-AF_lgrossmargin – post-AF_lgrossmargin = 0 vs.

Ha: median of pre-AF_lgrossmargin – post-AF_lgrossmargin > 0

Pr(#positive >= 237) =

Binomial(n = 237, x >= 237, p = 0.5) = 0.0000

Ho: median of pre-AF_lgrossmargin – post-AF_lgrossmargin = 0 vs.

Ha: median of pre-AF_lgrossmargin – post-AF_lgrossmargin < 0

Pr(#negative >= 0) =

Binomial(n = 237, x >= 0, p = 0.5) = 1.0000

Two-sided test:

Ho: median of pre-AF_lgrossmargin – post-AF_lgrossmargin = 0 vs.

Ha: median of pre-AF_lgrossmargin – post-AF_lgrossmargin != 0

Pr(#positive >= 237 or #negative >= 237) =

min(1, 2*Binomial(n = 237, x >= 237, p = 0.5)) = 0.0000

Table 24 above indicates that there were 237 comparisons for which gross margin (lgrossmargin) pre-AF period exceeded gross margin post-AF period, zero comparison for which gross margin post-AF period exceeded gross margin pre-AF period, and 303 comparisons for which they were the same.

Based on the binomial distribution where the alternative hypothesis is that the median of post-AF_lgrossmargin – pre-AF_lgrossmargin > 0, the significance of the one-sided test is 1. Similarly, the significance of the two-sided test, where the alternative hypothesis is simply that the median of the differences is different from zero, is 0.

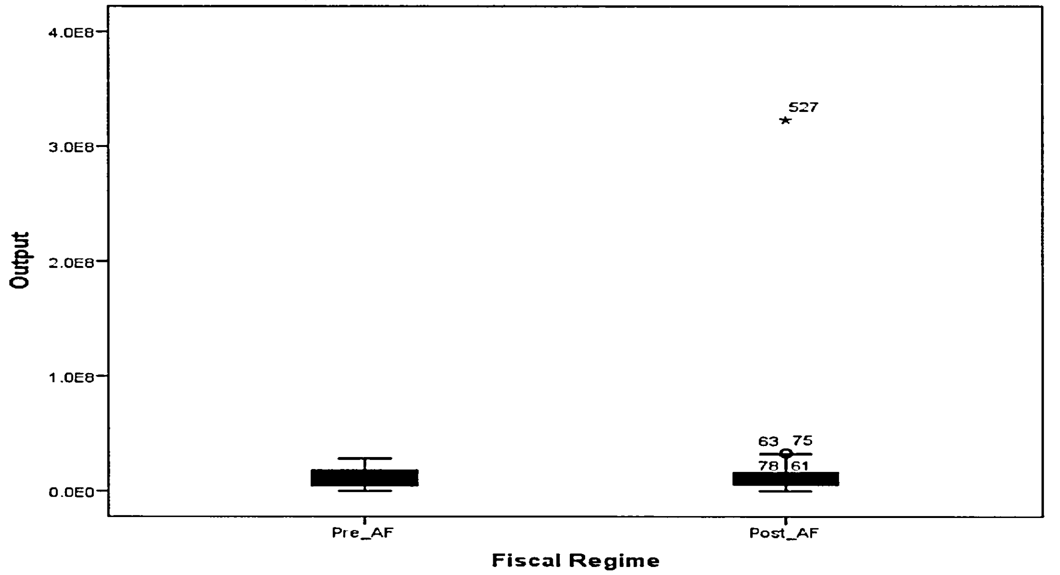
Similarly, findings from Table 24 above indicates that alternative funding arrangement improved gross margin of the upstream oil and gas companies in the post-AF period. Therefore, we can reject the null hypothesis below:

Hypothesis $_{1.0}$: Gross margin is not significantly higher in the post-alternative funding period

5.5.1.4 Crude Oil Production

Table 18 above indicates that there was a decrease in crude oil production in the Post-AF period (mean value +6% and median value -21%). Find below a box plot presenting a pictorial change in the companies' crude oil production:

Figure 5: Box plot comparing Pre-AF vs. Post-AF on Crude Oil Production



From the box plot above, we can see that there is more variability in the post alternative funding period. This is evidenced by changes in companies' crude oil production, see Table 25 below.

Table 25: Pre-AF vs. Post-AF Descriptive on Crude Oil Production

AF				Statistic	Std. Error
Output	Pre_AF	Mean		12048142.16	483140.773
		95% Confidence Interval for Mean	Lower Bound	11096384.11	
			Upper Bound	12999900.21	
		5% Trimmed Mean		11783845.61	
		Median		12695695.50	
		Variance		5.602E+13	
		Std. Deviation		7484784.669	
		Minimum		12940	
		Maximum		28257977	
		Range		28245037	
		Interquartile Range		13638377	
		Skewness		.326	.157
		Kurtosis		-1.189	.313
	Post_AF	Mean		12818198.27	1149836.221
		95% Confidence Interval for Mean	Lower Bound	10555401.46	
			Upper Bound	15080995.08	
		5% Trimmed Mean		11378076.47	
		Median		10074813.50	
		Variance		3.966E+14	
		Std. Deviation		19915747.554	
		Minimum		0	
		Maximum		323129035	
		Range		323129035	
		Interquartile Range		10716699	
		Skewness		12.784	.141
		Kurtosis		198.179	.281

We can see from Table 25 above, the minimum crude oil productions were 12,940bbls and 0bbl in the Pre-AF and Post-AF periods respectively and the maximum crude oil productions were 28,257,977bbls and 323,129,035bbls respectively.

Consequently, the median of crude oil production in the Pre-AF period was 12,695,695bbls but this was reduced in the Post-AF period to 10,074,813bbls.

5.5.1.4.1 Wilcoxon Sign Test on Crude Oil Production

Table 26: Sign Test on Crude Oil Production (loutput)

sign	observed	expected
positive	240	120
negative	0	120
zero	300	300
all	540	540

One-sided tests:

Ho: median of pre-AF_loutput – post-AF_loutput = 0 vs.

Ha: median of pre-AF_loutput – post-AF_loutput > 0

Pr(#positive >= 240) =

Binomial(n = 240, x >= 240, p = 0.5) = 0.0000

Ho: median of pre-AF_loutput – post-AF_loutput = 0 vs.

Ha: median of pre-AF_loutput – post-AF_loutput < 0

Pr(#negative >= 0) =

Binomial(n = 240, x >= 0, p = 0.5) = 1.0000

Two-sided test:

Ho: median of pre-AF_loutput – post-AF_loutput = 0 vs.

Ha: median of pre-AF_loutput – post-AF_loutput != 0

Pr(#positive >= 240 or #negative >= 240) =

min(1, 2*Binomial(n = 240, x >= 240, p = 0.5)) = 0.0000

Table 26 above indicates that there were 240 comparisons for which crude oil production (loutput) pre-AF period exceeded crude oil production post-AF period, zero comparison for which crude oil production post-AF period exceeded crude oil production pre-AF period, and 300 comparisons for which they were the same.

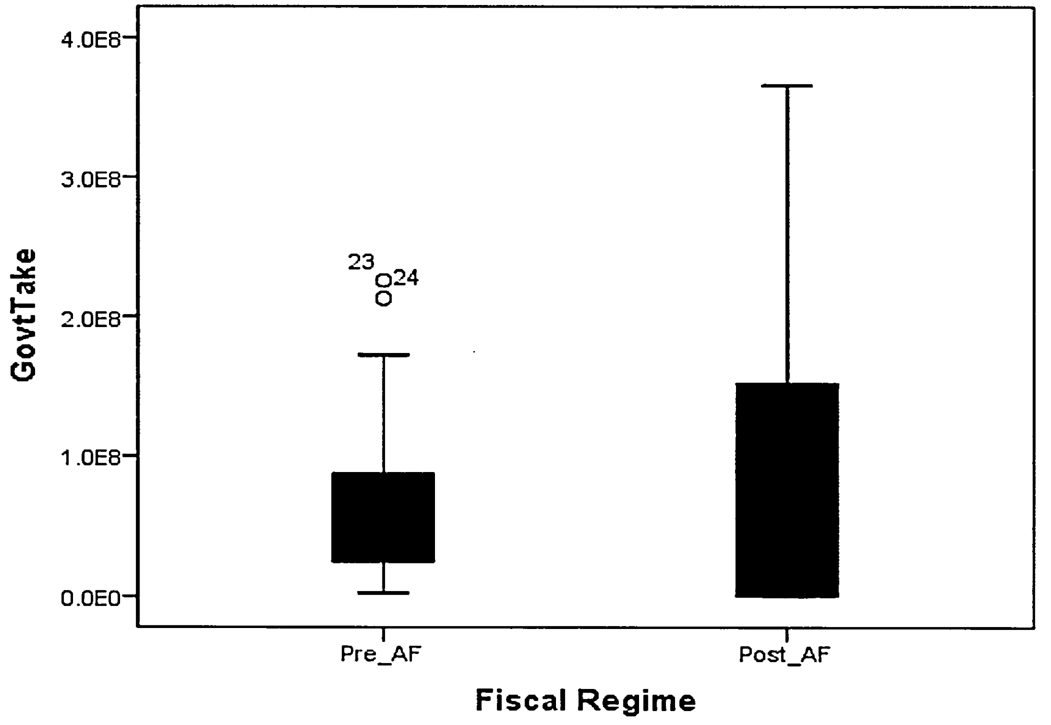
Based on the binomial distribution where the alternative hypothesis is that the median of post-AF_loutput – pre-AF_loutput > 0, the significance of the one-sided test is 1. Similarly, the significance of the two-sided test, where the alternative hypothesis is simply that the median of the differences is different from zero, is 0. Findings from the above tests indicate that alternative funding arrangement did not improve crude oil production of the upstream oil and gas companies in the post-AF period. Therefore, we cannot reject the null hypothesis below:

Hypothesis $_{2.0}$: Crude oil production is not significantly higher in the post-alternative funding period

5.5.1.5 Government Take

Table 18 above indicates that there was no significant improvement in Government Take in the Post-AF period (mean value +62% and median value +15%). Find below a box plot presenting a pictorial change in Government Take:

Figure 6: Box plot comparing Pre-AF vs. Post-AF on Government Take



From the box plot above, we can see that there is more variability in the post alternative funding period. This is evidenced by changes in Government Take, see Table 27 below:

Table 27: Pre-AF vs. Post-AF Descriptives on Government Take

AF				Statistic	Std. Error
GovtTake	Pre_AF	Mean		58488441.67	2649043.247
		95% Confidence Interval for Mean	Lower Bound	53269986.99	
			Upper Bound	63706896.35	
		5% Trimmed Mean		55741662.04	
		Median		47519000.00	
		Variance		1.684E+15	
		Std. Deviation		41038801.514	
		Minimum		2577000	
		Maximum		225887000	
		Range		223310000	
		Interquartile Range		62836000	
		Skewness		.977	.157
		Kurtosis		1.003	.313
	Post_AF	Mean		94798555.49	6108629.459
		95% Confidence Interval for Mean	Lower Bound	82777202.34	
			Upper Bound	106819908.64	
		5% Trimmed Mean		85427787.71	
		Median		54726500.00	
		Variance		1.119E+16	
		Std. Deviation		105804565.878	
		Minimum		41908	
		Maximum		365850000	
		Range		365808092	
		Interquartile Range		151908585	
		Skewness		1.153	.141
		Kurtosis		.338	.281

We can see from Table 27 above, the minimum Government Take was \$2,577,000 and \$41,908 in the Pre-AF and Post-AF periods respectively and the maximum Government Take was \$225,887,000 and \$365,850,000 respectively.

Consequently, the median of Government Take in the Pre-AF period was $47,519,000 but this was increased in the Post-AF period to $54,726,500.

For us to be able to test for the effect of alternative funding on Government Take, we have to look into the effect of alternative funding on both the royalty payments and petroleum profits tax separately.

5.5.1.5.1 Wilcoxon Sign Test on Royalty Payments

Table 28: Sign Test on Royalty Payments (lroyalty)

sign	observed	expected
positive	240	120
negative	0	120
zero	300	300
all	540	540

One-sided tests:

Ho: median of pre-AF_lroyalty – post-AF_lroyalty = 0 vs.

Ha: median of pre-AF_lroyalty – post-AF_lroyalty > 0

Pr(#positive >= 240) =

Binomial(n = 240, x >= 240, p = 0.5) = 0.0000

Ho: median of pre-AF_lroyalty – post-AF_lroyalty = 0 vs.

Ha: median of pre-AF_lroyalty – post-AF_lroyalty < 0

Pr(#negative >= 0) =

Binomial(n = 240, x >= 0, p = 0.5) = 1.0000

Two-sided test:

Ho: median of pre-AF_lroyalty – post-AF_lroyalty = 0 vs.

Ha: median of pre-AF_lroyalty – post-AF_lroyalty != 0

Pr(#positive >= 240 or #negative >= 240) =

min(1, 2*Binomial(n = 240, x >= 240, p = 0.5)) = 0.0000

Table 28 above indicates that there were 240 comparisons for which royalty payments (lroyalty) pre-AF period exceeded royalty payments post-AF period, zero comparison for which royalty payments post-AF period exceeded royalty payments pre-AF period, and 300 comparisons for which they were the same.

Based on the binomial distribution where the alternative hypothesis is that the median of post-AF_lroyalty – pre-AF_lroyalty > 0, the significance of the one-sided test is 1. Similarly, the significance of the two-sided test, where the alternative hypothesis is simply that the median of the differences is different from zero, is 0. Findings from the above tests indicate that alternative funding arrangement did not increase royalty payments by the upstream oil and gas companies in the post-AF period. Therefore, we cannot reject the null hypothesis below:

Hypothesis $_{4.0}$: Government take is not significantly higher in the post-alternative funding period

It is important to state that royalty payments are part of Government Take together with the petroleum profit tax, an issue discussed hereunder.

5.5.1.5.2 Wilcoxon Sign Test on Petroleum Profit Tax

Table 29: Sign Test on Petroleum Profit Tax (lppt)

sign	observed	expected
positive	236	118
negative	0	118
zero	304	304
all	540	540

One-sided tests:

Ho: median of pre-AF_lppt – post-AF_lppt = 0 vs.

Ha: median of pre-AF_lppt – post-AF_lppt > 0

Pr(#positive >= 236) =

Binomial(n = 236, x >= 236, p = 0.5) = 0.0000

Ho: median of pre-AF_lppt – post-AF_lppt = 0 vs.

Ha: median of pre-AF_lppt – post-AF_lppt < 0

Pr(#negative >= 0) =

Binomial(n = 236, x >= 0, p = 0.5) = 1.0000

Two-sided test:

Ho: median of pre-AF_lppt – post-AF_lppt = 0 vs.

Ha: median of pre-AF_lppt – post-AF_lppt != 0

Pr(#positive >= 236 or #negative >= 236) =

min(1, 2*Binomial(n = 236, x >= 236, p = 0.5)) = 0.0000

Table 29 above indicates that there were 236 comparisons for which petroleum profit tax payments (lppt) pre-AF period exceeded petroleum profit tax payments post-AF period, zero comparison for which petroleum profit tax payments post-AF period exceeded petroleum profit tax payments pre-AF period, and 304 comparisons for which they were the same.

Based on the binomial distribution where the alternative hypothesis is that the median of post-AF_lppt – pre-AF_lppt > 0, the significance of the one-sided test is 1. Similarly, the significance of the two-sided test, where the alternative hypothesis is simply that the median of the differences is different from zero, is 0. Findings from the above tests indicate that alternative funding arrangement did not increase petroleum profit tax payments by the upstream oil and gas companies in the post-AF period. Therefore, we cannot reject the null hypothesis below:

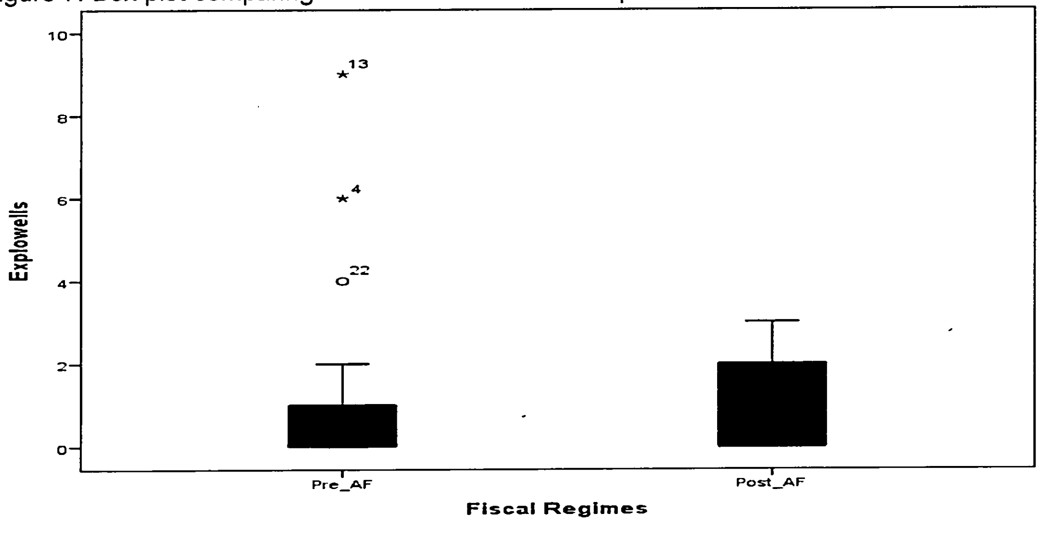
> *Hypothesis $_{4.0}$: Government take is not significantly higher in the post-alternative funding period*

We now look into the effect of alternative funding on exploration activities, an issue discussed hereunder.

5.5.1.6 Exploration Activities

Table 18 above indicates that there was no significant improvement in exploration activities in the Post-AF period. In fact, such drilling activities reduced significantly (mean value -40% and median value -100%). Find below a box plot presenting a pictorial change in exploration activities:

Figure 7: Box plot comparing Pre-AF vs. Post-AF on Exploration Activities



From the box plot above, we can see that there is more variability in the pre alternative funding period. This is evidenced by changes in exploration activities, see Table 30 below:

We can see from Table 30 below, the minimum number of wells drilled was zero in both the Pre-AF and Post-AF periods, and the maximum number of wells drilled was 9 and 3 in the Pre-AF and Post-AF periods respectively.

Consequently, the median of the number of wells drilled in the Pre-AF period was one but this was reduced in the Post-AF period to zero.

Table 30: Pre-AF vs. Post-AF Descriptives on Exploration Activities

AF				Statistic	Std. Error
Explowells	Pre_AF	Mean		1.40	.525
		95% Confidence Interval for Mean	Lower Bound	.30	
			Upper Bound	2.50	
		5% Trimmed Mean		1.06	
		Median		1.00	
		Variance		5.516	
		Std. Deviation		2.349	
		Minimum		0	
		Maximum		9	
		Range		9	
		Interquartile Range		1	
		Skewness		2.388	.512
		Kurtosis		5.637	.992
	Post_AF	Mean		0.84	.214
		95% Confidence Interval for Mean	Lower Bound	.40	
			Upper Bound	1.28	
		5% Trimmed Mean		.77	
		Median		0.00	
		Variance		1.140	
		Std. Deviation		1.068	
		Minimum		0	
		Maximum		3	
		Range		3	
		Interquartile Range		2	
		Skewness		.790	.464
		Kurtosis		-.887	.902

5.5.1.6.1 Wilcoxon Sign Test on Exploration Activities

Table 31: Sign Test on Exploration Activities

sign	observed	expected
positive	45	22
negative	0	23
zero	4 5	4 5
all	45	45

One-sided tests:

Ho: median of pre-AF_lexplowells – post-AF_lexplowells = 0 vs.

Ha: median of pre-AF_lexplowells – post-AF_lexplowells > 0

Pr(#positive >= 0) =

Binomial(n = 45, x >= 45, p = 0.5) = 0.0000

Ho: median of pre-AF_lexplowells – post-AF_lexplowells = 0 vs.

Ha: median of pre-AF_lexplowells – post-AF_lexplowells < 0

Pr(#negative >= 0) =

Binomial(n = 45, x >= 0, p = 0.5) = 1.0000

Two-sided test:

Ho: median of pre-AF_lexplowells – post-AF_lexplowells = 0 vs.

Ha: median of pre-AF_lexplowells – post-AF_lexplowells != 0

Pr(#positive >= 45 or #negative >= 45) =

min(1, 2*Binomial(n = 45, x >= 45, p = 0.5)) = 0.0000

Table 31 above indicates that there were 45 comparisons for which exploration activities (lexplowells) pre-AF period exceeded exploration activities post-AF period, zero comparison for which exploration activities post-AF period exceeded exploration activities pre-AF period, and 45 comparisons for which they were the same.

Based on the binomial distribution where the alternative hypothesis is that the median of post-AF_lexplowells – pre-AF_lexplowells > 0, the significance of the one-sided test is 1. Similarly, the significance of the two-sided test, where the alternative hypothesis is simply that the median of the differences is different from zero, is 0. Findings from the above tests indicate that alternative funding arrangement did not increase exploration activities by the upstream oil and gas companies in the post-AF period. Therefore, we cannot reject the null hypothesis below:

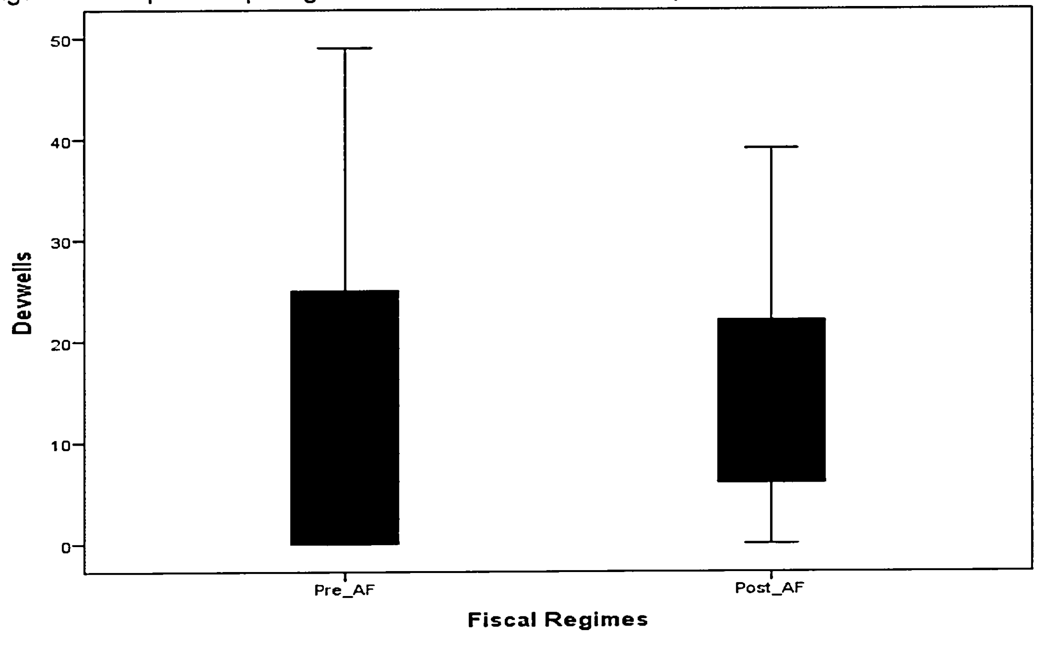
Hypothesis $_{6.0}$: Exploration activities are not significantly higher in the post-alternative funding period

We now look into the effect of alternative funding on the development activities, an issue discussed hereunder.

5.5.1.7 Development Activities

Table 18 above indicates that there was no improvement in development activities in the Post-AF period. In fact, such drilling activities reduced (mean value -0.7% and median value -50%). Find below a box plot presenting a pictorial change in development activities:

Figure 8: Box plot comparing Pre-AF vs. Post-AF on Development Activities



From the box plot above, we can see that there is more variability in the pre alternative funding period. This is evidenced by changes in development activities, see Table 32 below:

Table 32: Pre-AF vs. Post-AF Descriptives on Development Activities

	AF			Statistic	Std. Error
Devwells	Pre_AF	Mean		15.15	3.677
		95% Confidence Interval for Mean	Lower Bound	7.45	
			Upper Bound	22.85	
		5% Trimmed Mean		14.11	
		Median		12.00	
		Variance		270.345	
		Std. Deviation		16.442	
		Minimum		0	
		Maximum		49	
		Range		49	
		Interquartile Range		26	
		Skewness		.930	.512
		Kurtosis		-.153	.992
	Post_AF	Mean		15.04	1.999
		95% Confidence Interval for Mean	Lower Bound	10.91	
			Upper Bound	19.17	
		5% Trimmed Mean		14.69	
		Median		18.00	
		Variance		99.873	
		Std. Deviation		9.994	
		Minimum		0	
		Maximum		39	
		Range		39	
		Interquartile Range		16	
		Skewness		.013	.464
		Kurtosis		-.126	.902

We can see from Table 32 above, the minimum number of wells drilled was zero in both the Pre-AF and Post-AF periods, and the maximum number of wells drilled was 49 and 39 in the Pre-AF and Post-AF periods respectively.

Consequently, the median of the number of wells drilled in the Pre-AF period was 12 but this was increased in the Post-AF period to 18.

5.5.1.7.1 Wilcoxon Sign Test on Development Activities

Table 33: Sign Test on Development Activities

sign	observed	expected
sitive	45	20
po		
negative	0	25
zero	4 5	4 5
all	45	45

One-sided tests:

Ho: median of pre-AF_ldevwells – post-AF_ldevwells = 0 vs.

Ha: median of pre-AF_ldevwells – post-AF_ldevwells > 0

Pr(#positive >= 45) =

Binomial(n = 45, x >= 45, p = 0.5) = 0.0000

Ho: median of pre-AF_ldevwells – post-AF_ldevwells = 0 vs.

Ha: median of pre-AF_ldevwells – post-AF_ldevwells < 0

Pr(#negative >= 0) =

Binomial(n = 45, x >= 0, p = 0.5) = 1.0000

Two-sided test:

Ho: median of pre-AF_ldevwells – post-AF_ldevwells = 0 vs.

Ha: median of pre-AF_ldevwells – post-AF_ldevwells != 0

Pr(#positive >= 45 or #negative >= 45) =

min(1, 2*Binomial(n = 156, x >= 45, p = 0.5)) = 0.0000

Table 33 above indicates that there were 45 comparisons for which development activities (ldevwells) pre-AF period exceeded development activities post-AF period, zero comparison for which development activities post-AF period exceeded development activities pre-AF period, and 0 comparisons for which they were the same.

Based on the binomial distribution where the alternative hypothesis is that the median of post-AF_ldevwells – pre-AF_ldevwells > 0, the significance of the one-sided test is 1. Similarly, the significance of the two-sided test, where the alternative hypothesis is simply that the median of the differences is different from zero, is 0. Findings from the above tests indicate that alternative funding arrangement did not increase development activities by the upstream oil and gas companies in the post-AF period. Therefore, we cannot reject the null hypothesis below:

Hypothesis $_{7.0}$: Development activities are not significantly higher in the post-alternative funding period

5.6 Chapter Summary

Overall, we can see from the foregoing analysis that the alternative funding arrangement that was introduced in 2003 has improved the capital expenditures made by the upstream oil and gas companies and their profitability. However, we can see that such alternative funding arrangements did not improve the drilling activities of the upstream oil and gas companies.

Therefore, the implication of these findings is that policy makers need to review such alternative funding arrangements so that Government will benefit from in the long run; because the future of the industry largely depends on the drilling activities that are taking place now. This is against the backdrop of calls for more flexible alternative funding arrangements by the upstream oil and gas companies in Nigeria; one of the managers of such companies stated that "We urgently need to put money onshore. Financial institutions must come in. Government must also be more flexible. Oil companies must come up with innovative solutions to help fund their operations" (Bello and Akpe, 2013, p. 1). The implication of this accession is that the upstream oil and gas companies need Government to be much more flexible in terms of funding the operations of the JVCs. However, the implication of doing such may result to less Government revenue.

CHAPTER SIX: SUMMARY AND CONCLUSION

CHAPTER SIX: SUMMARY AND CONCLUSION

6.1 Introduction

This chapter presents summary of findings and draws some conclusions based on the findings. Contributions made by the study are also enumerated in this chapter. Similarly, some of the limitations of the study are enumerated. Accordingly, areas for future study are suggested. Section 6.2 presents the summary of our findings. Conclusions drawn from the findings are presented in section 6.3. Contributions of the study are enumerated in section 6.4. Finally, limitations of the study and areas for future study are presented in section 6.5.

6.2 Summary of Findings

Revenue enhancement is one of the major reasons advanced in the argument on why Government has ownership in upstream oil and gas operations. This is largely because Government increases its take by not only having a substantial ownership but also controlling the upstream oil and gas operations. On the other hand, it is believed that Government ownership in the upstream oil and gas operations reduces the efficiency of such operations, thereby discouraging investment by the IOCs.

In Nigeria, Government participates in upstream oil and gas operations in what is commonly known as JV operations. Government owns about 57% stake in the JVCs which operate alongside other companies (non-JVCs).

Therefore, the aim of this study was to investigate the effect of such government ownership in upstream oil and gas companies operating in Nigeria. Below is the summary of major findings of our study which are categorised into two major sub-sections; these are findings on the effect of government ownership on performance of the upstream oil and gas companies and findings on the effect of alternative funding on performance of the upstream oil and gas companies.

6.2.1 Findings on the Effect of Government Ownership on Companies' Performance

One of the objectives of this study was to investigate the effect of government ownership on production efficiency of the upstream oil and gas companies operating in Nigeria. Similarly, another objective of the study is to investigate the effect of government ownership on gross margin of the upstream oil and gas companies. Consistent with the aforementioned research objectives and after reviewing the relevant literature, it was hypothesised (see Hypotheses 7 and 8) that government ownership improves performance of the upstream oil and gas companies on both cost efficiency and gross margin respectively. These hypotheses were formulated based on the following assumptions:

Government ownership in the JVCs provides government with majority representation on the management boards of the JVCs. Hence providing government with the necessary strength to be able to influence vital decisions associated with the operations of the JVCs; which in turn affects their performance.

Secondly, unlike under the non-JVCs where the IOCs are less motivated due to non-ownership in oil resources, the joint operating agreement (JOA) underpinning operations of the JVCs provide the IOCs with a high-powered incentive by allowing them to have a real ownership in the oil resources commensurate with their stake in the JVCs. Therefore, it is argued that this high-powered incentive system makes the JVCs to be more efficient and profitable than the non-JVCs.

Consequently, data on the relevant performance metrics were collected and analysed. The results obtained indicate that JVCs are more efficient and profitable than the non-JVCs. At this juncture, it is important to state that findings of this study reaffirmed the findings of previous studies on the performance of the upstream oil and gas sector in Nigeria (see Alalade, 2004 and Akinwumi, 2009). For example, Akinwumi (2009) argued that ineffective government control mechanism in the upstream oil and gas sector leads to cost gold-plating in the case of non-JVCs which findings of this study indicate that the non-JVCs are less efficient in their operations; which was found to be that the non-JVCs spend twice as much as the JVCs in producing a barrel of crude oil.

Consequently, findings of this study indicate that JVCs, which are substantially owned by the government, are more efficient and profitable than the non-JVCs, which are privately owned. Therefore, findings of this study are not in-line with the view that private firms are inherently more efficient than the non-private firms, as argued by Victor (2007) and Wolf (2009). Similarly, findings of this study reaffirmed the view of Dewenter and Malatesta (2001) that even the private companies can be as inefficient as the non-private companies, depending on the circumstances surrounding their operations.

For example, in the context of what obtains in the Nigerian upstream oil and gas operations, the need for arrangements other than the JVCs "... is mainly to overcome the problem (funding), otherwise the JVCs evidently generate more revenue to government" (Adam, 2014, p. 288). Therefore, findings of this study clearly reaffirmed the aforementioned view.

In the context of findings of this study are in-line with the literature on the effect of government ownership on the performance of companies, this study considered the view of Alchain (1965) that the diffusion in ownership in the non-private firms and the lack of incentive are some of the major reasons why the private firms outperform the non-private firms. However, considering that the JVCs are owned by both government and private companies and the availability of high-powered incentive-system in the JVCs, it can be argued here that findings of this study provide an interesting perspective on the government role in enhancing the performance of companies especially in the upstream oil and gas sector where institutions that are encumbered with responsibility of managing the affairs of the industry are weak.

Similarly, findings of this study clearly indicate the importance of government ownership in the upstream oil and gas operations in Nigeria. This is in-line with the view of Inkpen and Moffett (2011) who stated that state ownership is desirable if and when the economic activity in a particular oil-rich nation renders the drafting of oil contracts incomplete and the stake-keepers (see 3.3.2) do not have the capacity to regulate the operations of the major stake-holders (see 3.3.1) effectively.

Therefore, it can be argued here that the stake-keepers discussed under the institutional framework in the Nigerian oil and gas industry are ineffective in their duties; which makes the government ownership in the upstream operations vital, since the stake-keepers cannot regulate the stake-holders effectively. This argument is in-line with the view of Eller *et al.* (2011) that the major regulatory institution in the Nigerian oil and gas industry is a confused institution; confused in the sense that a regulatory function is mistaken for commercial function. This state of confusion clearly warrants the overhauling of the operational and structural settings in the Nigerian upstream oil and gas sector (Kassim-Momodu and Nwajide, 2012).

Similarly, a recent study conducted by Adam (2014) argued that such institution is deficient in its mandate for ensuring value for money in the Nigerian upstream oil and gas operations. Therefore, it can be concluded here that government ownership in the upstream oil and gas operations in Nigeria is not only timely but very essential in ensuring the attainment of government's strategic objectives in the industry.

The summary of findings on the effect of government ownership indicate that government ownership is a determining factor in the performance of upstream oil and gas companies in Nigeria. The findings of this study are in line with the assumptions of agency theory, that agent performs differently based on its ownership right on asset. Considering the assumption that agent's ownership right on asset influences the agent's actions ex-ante, it can be argued that the JVCs have an optimal incentive-system in such a way that the IOCs ownership in the oil resources mitigates the potentials for adverse selection and moral hazard problems. Similarly, Government ownership in the JVCs provides it with the majority representation on the management boards of such companies, which is an effective control mechanism towards ensuring efficiency in operations.

However, under the non-JVCs (PSC for example), Government control is only limited to vetting of the work programs to be undertaken by the upstream oil and gas companies, with no voting right on the management boards of such companies. Since the companies have to recoup their total costs before any profit is shared between them and the Government, the argument here is that such companies may not be as efficient as companies where Government has a majority stake and controls substantial aspect of the operations. This is in line with the assumption of separation of ownership and control expounded in our theoretical framework under agency theory.

6.2.2 Findings on the Effect of Alternative Funding on Companies' Performance

Findings of this study indicate that the alternative funding arrangement does not yield positive results on the drilling activities of the upstream oil and gas companies; which is a serious policy implication for government consideration in the long-run. Even though such arrangement increased government take now but lack of improvement in the drilling activities may be detrimental to the performance of the sector in the future; as Wilcoxon tests conducted indicated that the upstream oil and gas companies performed better in drilling before the alternative funding arrangement was introduced.

It is important to note here that, to the best of the researcher's knowledge, this study is the first of its kind to have investigated the effect of government ownership on non-financial performance such as exploration and development activities. Therefore, this can be considered as one of the major contributions of this study.

6.3 Conclusions

Findings of this study indicate the importance of government ownership in upstream oil and gas operations in Nigeria. Therefore, our findings are not in-line with the argument that government ownership in upstream operations is associated with inefficient operations of the upstream oil and gas companies which results to divestment in the upstream sector and consequent loss of government revenue.

On the contrary, findings of this study indicate that government ownership really matters in improving production efficiency and companies' profitability of the upstream oil and gas companies operating in Nigeria. Therefore, in the comparative analysis of the JVCs and the non-JVCs we can conclude that the JVCs, where government has ownership, are more efficient and profitable than the non-JVCs.

Considering the alternative funding arrangement, it can be seen that such arrangement succeeded in increasing the amount of capital expenditure, and the gross margin of the upstream oil and gas companies on one hand and increased government revenue on the other. However, such arrangement has negative effect on exploration and development activities. Therefore, it can be concluded here that the alternative funding arrangement largely benefits the upstream oil and gas companies and an increased government take in the short-run. In this regard, policy makers need to carefully re-examine such arrangement in such a way that it will be a win-win situation for both parties in the long-run.

6.4 Contribution of the Study

First of all, it is important to reiterate here that this study is an extension of previous studies conducted on the Nigerian upstream oil and gas sector as enumerated in the empirical part of the study.

Findings of the study corroborate the findings of Alalade (2004) that government participation in upstream activities positively affects the financial performance of the upstream oil and gas companies that are involved in such operations.

While it is difficult to make a general conclusion on the positive effect of government ownership on the performance of companies in other sectors, findings of this study provide us with an interesting perspective that we can make such conclusions on upstream oil and gas companies operating in Nigeria.

Findings of this study contribute to the debate on agency theory that separation of ownership and control results to a serious agency problem, especially in upstream oil and gas sector where there are huge risks associated with investments. Nonetheless, findings of this study indicate that such agency problems may be addressed in the upstream oil and gas sector via active participation by government which results to efficient operations by the relevant companies involved in such operations, especially in a developing country like Nigeria where the upstream oil and gas industry stake-keepers are ineffective in ensuring their mandate.

Similarly, findings of this study indicate that the preferred alternative funding arrangement by the upstream oil and gas companies is counterproductive from the government perspective because it hampers investment in drilling activities which have a severe negative effect in the long-run. This is especially dangerous because the upstream oil and gas companies may opt for short-termism in order for them to recover their investment within the shortest possible time.

However, if government were the provider of such funds such short-termism would have been automatically addressed because government strategic objective for long-term investment is in stark contrast to that of the private companies whose short-term attitude is manifested in their laidback attitude towards investing in drilling activities.

Therefore, it is important to state here that the alternative funding arrangement is somewhat similar to the PSC arrangement where government shields itself from the required investment in the upstream operations due to risk-averse attitude towards risk. Therefore, this study argues that the preference to the alternative funding arrangement by the upstream oil and gas companies is an opportunity cost for the long-term investment. Consequently, this is another policy implication and an issue the policy makers need to take very seriously due to its implication on the nation's revenue in the long-run.

6.5 Limitations of the Study and Areas for Future Study

Sufficient efforts have been made to address the questions on the possible effect of Government control on the performance of upstream oil and gas companies in Nigeria. In order to be able to address such questions, secondary data obtained from official statistics on the relevant performance variables were analysed using appropriate techniques.

Even though such data presented us with the basic facts on the performance of the relevant companies, there may be more interesting findings if such secondary data were coupled with a primary data; this is an issue that may be exploited in the future. However, considering the appalling situation in the Nigerian oil and gas industry at the moment an attempt to either administer a questionnaire or conduct interview was considered not feasible by the researcher considering the need for managers of such upstream oil and gas companies needed to respond to such questions if meaningful conclusions were to be drawn.

A case in point is the non-response by the managers of such companies to a questionnaire issued by NEITI; as stated "a questionnaire on control procedures over Capex and Opex was issued to all companies... (but only one) company responded" (NEITI, 2005, p.11). Therefore, this may be an area where the views of the managers of the relevant companies need to be taken into consideration in the future by obtaining a primary data via either a questionnaire or an interview.

Further, the use of official statistics may be a serious limitation because such statistics include not only facts about the phenomena under consideration but also social and political constructions (Mahmud and Russell, 1999), which may be manipulated by the political actors, administrators or even the researchers (Bhat *et al.*, 1988).

Therefore, because such official statistics may be manipulated by the political actors or their agencies (Bulmer, 1986), the accuracy of such statistics are sometimes seriously questioned (Jones, 1992). Nonetheless, such official statistics provided us with quite a useful data in the Nigerian context where data on the upstream oil and gas operations are treated with utmost confidentiality. As mentioned above, a primary data may be required to corroborate such statistics, an area worth exploiting in the future.

Furthermore, this study focused only on oil; however, an upstream oil company may produce either oil, gas or both oil and gas. In the first instance, if oil is considered the primary business of the upstream oil and gas company, then whatever comes from gas will be considered a reduction in the cost of oil produced. However, data on gas production is not enough to warrant comprehensive analysis. Therefore, an interesting question to be address in the future is what motivates the companies to opt for the production of either of the two or the combination of the two?

The negative effect of the DMOs on the performance of oil companies revealed by Eller *et al.* (2011) raises an important question in the Nigerian context. In Nigeria, for example, from 1999 up until 2003 (when the alternative funding arrangement was introduced), the price of domestic crude sales was determined by the Government. However, from 2003 up to 2011 the price of domestic crude sales was based on the prevailing market price.

Considering the variations in the price of domestic crude sales discussed in chapter two sub-section 2.4.2.4, an important question to be addressed in the future is to what extent Government regulation on domestic crude oil price affects the gross margin of the upstream companies? Also, since the domestic crude sale has a direct implication on the oil revenue accruable to the Government, it will be interesting to address the question as to what extent Government regulation on domestic crude sales affects government oil revenue?

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Appendices

Appendix 9: OLS Regression Results on Production Efficiency

```
Linear regression                               Number of obs =      972
                                                F(  6,    965) = 4901.64
                                                Prob > F      =   0.0000
                                                R-squared     =   0.8586
                                                Root MSE      =   .39271
```

lcostbbl	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
loutput	-.9984199	.010398	-96.02	0.000	-1.018825	-.9780147
lopex	1.015116	.0128526	78.98	0.000	.9898939	1.040338
lroyalty	.0342787	.0015013	22.83	0.000	.0313325	.0372249
own_loutput	.1997828	.0833552	2.40	0.017	.0362046	.3633611
own_lopex	-.2693724	.0651128	-4.14	0.000	-.3971513	-.1415934
own_lroyalty	.0913448	.019487	4.69	0.000	.0531029	.1295866
_cons	-.2426415	.1111136	-2.18	0.029	-.4606937	-.0245893

Appendix 2: FEM Regression Results on Production Efficiency

```
Fixed-effects (within) regression               Number of obs      =       972
Group variable: id                              Number of groups   =         9

R-sq:  within  = 0.7766                         Obs per group: min =       108
       between = 0.9435                                        avg =     108.0
       overall = 0.8225                                        max =       108

                                                F(6,8)             =    162.64
corr(u_i, Xb)  = 0.4060                         Prob > F           =    0.0000

                                    (Std. Err. adjusted for 9 clusters in id)
```

lcostbbl	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
loutput	-1.009169	.0355461	-28.39	0.000	-1.091138	-.9271995
lopex	1.017932	.0356268	28.57	0.000	.9357769	1.100088
lroyalty	.0335994	.0079039	4.25	0.003	.0153731	.0518257
own_loutput	.2157458	.231217	0.93	0.378	-.3174415	.7489332
own_lopex	-.2623086	.2226571	-1.18	0.273	-.7757568	.2511395
own_lroyalty	.0982895	.0185858	5.29	0.001	.0554305	.1411485
_cons	-.3948574	.2763208	-1.43	0.191	-1.032054	.2423396
sigma_u	.24902174					
sigma_e	.38524237					
rho	.29470008	(fraction of variance due to u_i)				

Appendix 3: REM Regression Results on Production Efficiency

```
Random-effects GLS regression                   Number of obs      =       972
Group variable: id                              Number of groups   =         9

R-sq:  within  = 0.7751                         Obs per group: min =       108
       between = 0.9859                                        avg =     108.0
       overall = 0.8586                                        max =       108

                                                Wald chi2(6)       =   6331.84
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

                                    (Std. Err. adjusted for 9 clusters in id)
```

lcostbbl	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
loutput	-.9993801	.0311255	-32.11	0.000	-1.060385	-.9383753
lopex	1.016272	.0309401	32.85	0.000	.9556305	1.076913
lroyalty	.0343573	.0030336	11.33	0.000	.0284115	.0403031
own_loutput	.2034973	.1669061	1.22	0.223	-.1236325	.5306272
own_lopex	-.2723051	.1552529	-1.75	0.079	-.5765952	.0319851
own_lroyalty	.0908574	.0093304	9.74	0.000	.0725701	.1091448
_cons	-.2493079	.1388946	-1.79	0.073	-.5215363	.0229205
sigma_u	.01649955					
sigma_e	.38524237					
rho	.00183097	(fraction of variance due to u_i)				

Appendix 4: Hausman Test for Fixed vs random Effects Models on Production Efficiency

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
loutput	-1.009169	-.9993801	-.0097889	.0163708
lopex	1.017932	1.016272	.0016603	.0112619
lroyalty	.0335994	.0343573	-.0007579	.0036822
own_loutput	.2157458	.2034973	.0122485	.0250923
own_lopex	-.2623086	-.2723051	.0099964	.0237401
own_lroyalty	.0982895	.0908574	.0074321	.0055658

```
                       b = consistent under Ho and Ha; obtained from xtreg
        B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       25.53
                Prob>chi2 =      0.0003
                (V_b-V_B is not positive definite)
```

Appendix 5: Breusch and Pagan Lagrangian Multiplier Test for Random Effects on Production Efficency

```
lcostbbl[id,t] = Xb + u[id] + e[id,t]
```

Estimated results:

	Var	sd = sqrt(Var)
lcostbbl	1.083887	1.041099
e	.1484117	.3852424
u	.0002722	.0164996

```
Test:   Var(u) = 0
                      chibar2(01) =    47.02
                  Prob > chibar2 =   0.0000
```

Appendix 6: OLS Regression Results on Gross Margin

```
Linear regression                         Number of obs =      972
                                          F(  9,    962) =   155.94
                                          Prob > F       =   0.0000
                                          R-squared      =   0.6820
                                          Root MSE       =   .86469
```

lgrossmargin	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
loutput	1.443406	.0511771	28.20	0.000	1.342974	1.543838
lopex	-1.042279	.0461283	-22.60	0.000	-1.132803	-.9517555
lroyalty	-.0436907	.0149724	-2.92	0.004	-.073073	-.0143083
lppt	-.0363551	.0141358	-2.57	0.010	-.0640956	-.0086145
own_loutput	-.9451906	.0790452	-11.96	0.000	-1.100312	-.7900697
own_lopex	.7592687	.0631844	12.02	0.000	.6352735	.8832639
own_lroyalty	.1104669	.0295024	3.74	0.000	.0525703	.1683634
own_lppt	-.0403597	.0222219	-1.82	0.070	-.0839688	.0032494
loilprice	.5879385	.072034	8.16	0.000	.4465766	.7293003
_cons	-.7545838	.3232599	-2.33	0.020	-1.38896	-.1202079

Appendix 7: FEM Regression Results on Gross Margin

```
Fixed-effects (within) regression               Number of obs      =        97
Group variable: id                              Number of groups   =

R-sq:  within  = 0.5732                         Obs per group: min =        10
       between = 0.9531                                        avg =      108.
       overall = 0.6717                                        max =        10

                                                F(8,8)             =         .
corr(u_i, Xb)  = -0.7397                        Prob > F           =         .

                                    (Std. Err. adjusted for 9 clusters in id)
```

lgrossmargin	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
loutput	1.69919	.2013627	8.44	0.000	1.234847	2.16353
lopex	-1.224354	.1750878	-6.99	0.000	-1.628107	-.820601
lroyalty	-.0768714	.0103257	-7.44	0.000	-.1006824	-.053060
lppt	-.012866	.0261553	-0.49	0.636	-.0731802	.047448
own_loutput	-1.1374	.2226098	-5.11	0.001	-1.65074	-.624061
own_lopex	.92279	.2008949	4.59	0.002	.4595255	1.38605
own_lroyalty	.1471946	.0306608	4.80	0.001	.0764906	.217898
own_lppt	-.0503936	.0303091	-1.66	0.135	-.1202866	.019499
loilprice	.5822079	.1012173	5.75	0.000	.3488004	.815615
_cons	-1.412047	.689879	-2.05	0.075	-3.002911	.178816
sigma_u	.50254106					
sigma_e	.82145773					
rho	.27233531	(fraction of variance due to u_i)				

Appendix 8 REM Regression Results on Gross Margin

```
Random-effects GLS regression                   Number of obs      =       972
Group variable: id                              Number of groups   =         9

R-sq:  within  = 0.5670                         Obs per group: min =       108
       between = 0.9447                                        avg =     108.0
       overall = 0.6820                                        max =       108

                                                Wald chi2(8)       =         .
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =         .

                                    (Std. Err. adjusted for 9 clusters in id)
```

lgrossmargin	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
loutput	1.443406	.1464666	9.85	0.000	1.156337	1.730475
lopex	-1.042279	.1303633	-8.00	0.000	-1.297786	-.7867719
lroyalty	-.0436907	.0198949	-2.20	0.028	-.0826839	-.0046975
lppt	-.0363551	.0194131	-1.87	0.061	-.074404	.0016939
own_loutput	-.9451906	.1805888	-5.23	0.000	-1.299138	-.5912431
own_lopex	.7592687	.1493441	5.08	0.000	.4665597	1.051978
own_lroyalty	.1104669	.0306426	3.61	0.000	.0504084	.1705253
own_lppt	-.0403597	.0233438	-1.73	0.084	-.0861126	.0053932
loilprice	.5879385	.0751706	7.82	0.000	.4406067	.7352703
_cons	-.7545838	.627247	-1.20	0.229	-1.983965	.4747977
sigma_u	0					
sigma_e	.82145773					
rho	0	(fraction of variance due to u_i)				

Appendix 9: Hausman Test Fixed-effect vs Random-effect Models on Gross Margin

	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
loutput	1.69919	1.443406	.2557838	.0347701
lopex	-1.224354	-1.042279	-.1820749	.0233091
lroyalty	-.0768714	-.0436907	-.0331807	.0030866
lppt	-.012866	-.0363551	.0234891	.0070455
own_loutput	-1.1374	-.9451906	-.1922097	.0513083
own_lopex	.92279	.7592687	.1635213	.0488819
own_lroyalty	.1471946	.1104669	.0367277	.0041181
own_lppt	-.0503936	-.0403597	-.0100339	.0047642
loilprice	.5822079	.5879385	-.0057306	.

Coefficients

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 12.23
Prob>chi2 = 0.2007
(V_b-V_B is not positive definite)

Appendix 10: Breusch and Pagan Lagrangian Multiplier Test for Random Effects on Gross Margin

Breusch and Pagan Lagrangian multiplier test for random effects

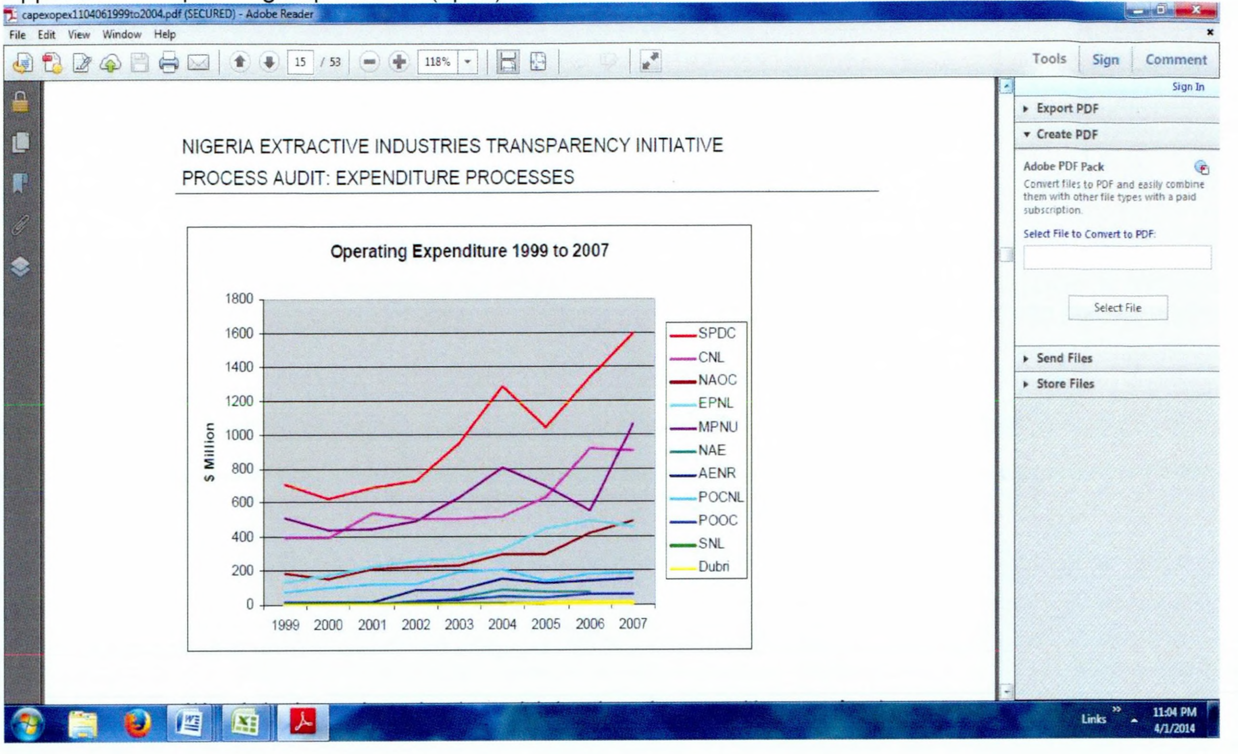
lgrossmargin[id,t] = Xb + u[id] + e[id,t]

Estimated results:

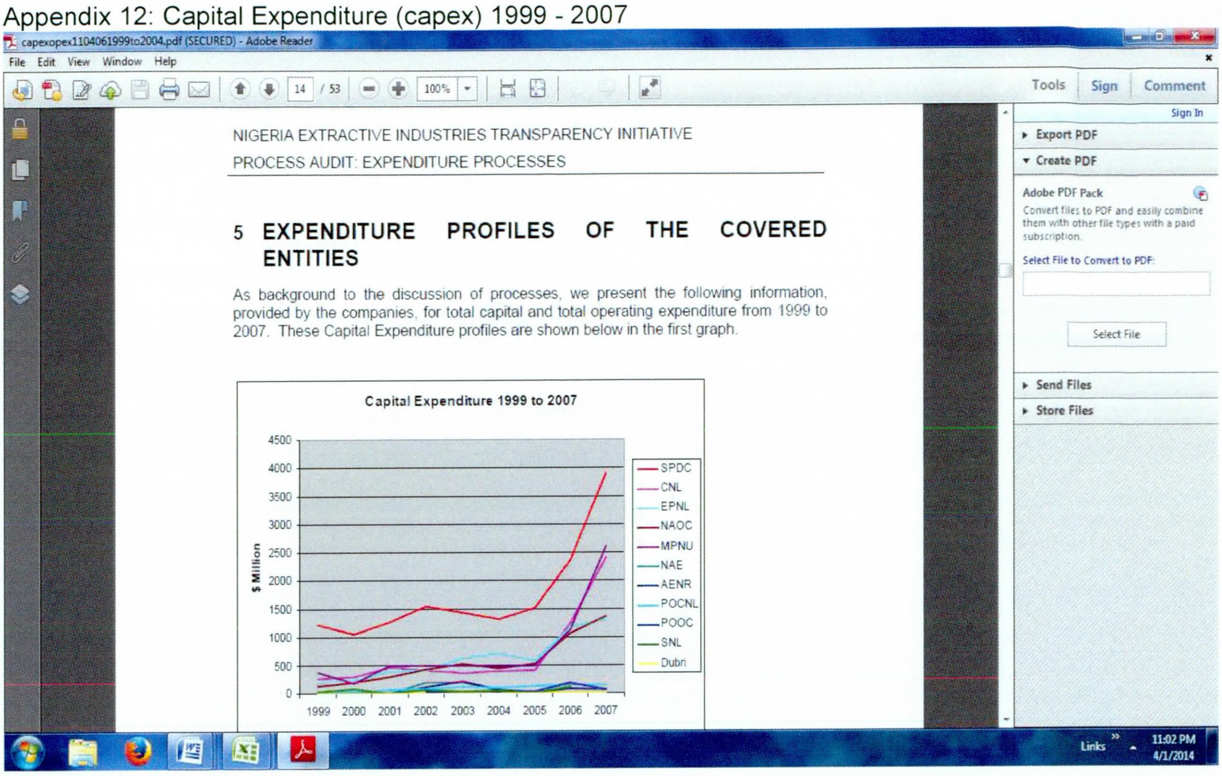
	Var	sd = sqrt(Var)
lgrossm~n	2.329692	1.526333
e	.6747928	.8214577
u	0	0

Test: Var(u) = 0
chibar2(01) = 0.00
Prob > chibar2 = 1.0000

Appendix 11: Operating Expenditure (opex) 1999 - 2007



Appendix 12: Capital Expenditure (capex) 1999 - 2007



NIGERIA EXTRACTIVE INDUSTRIES TRANSPARENCY INITIATIVE

PROCESS AUDIT: EXPENDITURE PROCESSES

5 EXPENDITURE PROFILES OF THE COVERED ENTITIES

As background to the discussion of processes, we present the following information, provided by the companies, for total capital and total operating expenditure from 1999 to 2007. These Capital Expenditure profiles are shown below in the first graph.

Appendix 103: Petroleum Act 1969 provisions on oil exploration and prospecting liceses and oil mining lease

Oil exploration licences

1. An oil exploration licence shall apply to the area specified therein which may be any area on which a premium has not been placed by the Minister, and shall authorise the licensee to undertake exploration for petroleum in the area of the licence, excluding land in respect of which the grant of an oil prospecting licence or oil mining lease has been approved by the Minister and land in respect of which an oil prospecting licence or oil mining lease is in force.

2. An oil exploration licence shall not confer any exclusive rights over the area of the licence, and the grant of an oil exploration licence in respect of any area shall not preclude the grant of another oil exploration licence or of an oil prospecting licence or oil mining lease over the same area or any part thereof.

3. An oil exploration licence shall terminate on 31 December next following the date on which it was granted, but the licensee shall have an option to renew the licence for one further year if:

(a) he has fulfilled in respect of the licence, all obligations imposed upon him by this Act or otherwise;

(b) the Minister is satisfied with work done and the reports submitted by the licensee in pursuance of the licence; and

(c) an application for renewal has been made at least three months before the date of expiry of the licence.

4. An oil exploration licence shall not confer any right to the grant of an oil prospecting licence or an oil mining lease.

Oil prospecting licences

5. The holder of an oil prospecting licence shall have the exclusive right to explore and prospect for petroleum within the area of his licence.

6. The duration of an oil prospecting licence shall be determined by the Minister, but shall not exceed five years (including any periods of renewal).

7. The holder of an oil prospecting licence may carry away and dispose of petroleum won during prospecting operations, subject to the fulfilment of obligations imposed upon him by or under this Act (including any special terms or conditions imposed under paragraph 34 of this Schedule) or by the Petroleum Profits Tax Act or any other law imposing taxation in respect of petroleum.

Oil mining leases

8. An oil mining lease may be granted only to the holder of an oil prospecting licence who has:

(a) satisfied all the conditions imposed on the licence or otherwise imposed on him by this Act; and

(b) discovered oil in commercial quantities.

9. For the purposes of paragraph 8 of this Schedule, oil shall be deemed to have been discovered in commercial quantities by the holder of an oil prospecting licence if the Minister, upon evidence adduced by the licensee, is satisfied that the licensee is capable of producing at least 10,000 barrels per day of crude oil from the licensed area.

10. The term of an oil mining lease shall not exceed twenty years, but may be renewed in accordance with this Act.

11. Subject to this Act and any special terms or conditions imposed under paragraph 34 of this Schedule, the lessee of an oil mining lease shall have the exclusive right within the leased area to conduct exploration and prospecting operations and to win, get, work, store, carry away, transport, export or otherwise treat petroleum discovered in or under the leased area.

12. (1) Ten years after the grant of an oil mining lease, one half of the area of the lease shall be relinquished.

(2) Paragraph 18 of this Schedule shall apply to the relinquished area.

13. (1) The lessee of an oil mining lease shall be entitled to apply in writing to the Minister, not less than twelve months before the expiration of the lease, for a renewal of the lease either in respect of the whole of the leased area or any particular part thereof; and the renewal shall be granted if the lessee has paid all rent and royalties due and has otherwise performed all his obligations under the lease.

3.4.2.2 Petroleum (Drilling and Production) Regulations 1969

Under section 9 of the 1979 Petroleum Act, the following provisions are made as they affect the drilling and production activities of the upstream oil and gas companies:

1. (1) Every application for an oil exploration licence, oil prospecting licence or oil mining lease shall be made to the Minister in writing on the appropriate form as set out in the Schedule to these Regulations.

(2) Every application shall be accompanied by:

(a) the prescribed fee as set out in Part VI of these Regulations (the fee in question not being refundable in any circumstances);

(b) ten copies of a map on a scale or scales specified by the Director of Petroleum Resources upon which is delineated in red the boundaries of the area in respect of which the application is made;

(c) an adequate survey description of the boundaries of that area (at least one boundary corner being tied, in the case of an application for an oil mining lease, to an official survey control beacon, or an existing survey mark itself previously tied to an official survey grid) or, where the area has been blocked out or delineated and described by or on behalf of the Minister, a reference to the particulars of identification used by him or on his behalf:

(d) evidence of the financial status and technical competence of the applicant;

(e) details of the work which the applicant is prepared to undertake or a programme for carrying out any minimum working obligations imposed;

(f) details of the annual expenditure which the applicant is prepared to make on each area applied for;

(g) the date on which he is prepared to begin operations after the grant of the oil exploration licence, oil prospecting licence or oil mining lease to which the application relates:

(h) details of a specific scheme for the recruitment and training of Nigerians:

(i) evidence of the applicant's ability to market any petroleum produced;

(j) annual reports in respect of the applicant's oil exploration and production activities in the preceding three years; and

(k) any other information which the Minister may call for by notice in the Federal Gazette or otherwise.

(3) The applicant shall furnish such further evidence relating to the matters mentioned in paragraph (2) of this regulation as the Director of Petroleum Resources may require.

2. (1) The boundaries of the area applied for:

(a) shall be straight lines in North to South and East to West directions and, where so required by the Director of Petroleum Resources, shall be coincident with all or part of any existing licence or lease boundaries or international or inter-State boundaries or with grid lines designated by him; or

(b) where the boundaries of the area have been already delineated by or on behalf of the Minister, shall correspond to those boundaries.

(2) The area applied for shall be a compact unit not exceeding in area

(a) in the case of an oil exploration licence, 5,000 square miles;

(b) in the case of an oil prospecting licence, 1,000 square miles;

(c) in the case of an oil mining lease, 500 square miles.

(3) All oil mining leases deriving from an oil prospecting licence shall be in

compact blocks or units; and, where more than one block or unit is so derived, each block or unit shall be the subject of a separate and distinct lease.

(4) Where there is provision for the relinquishment or surrender of part of the relevant area of a licence or lease, the relinquishment or surrender shall be such that the retained part is a compact unit as provided in paragraphs (2) and (3) of this regulation; and the licensee or lessee shall obtain the prior agreement of the Director of Petroleum Resources as to the shape and area of the retained part before an application for the relinquishment or surrender is made to the Minister.

3. An applicant may withdraw his application by notifying the Minister of his intention in writing, and the Minister shall accept the withdrawal if the prescribed fee is paid:

Provided that the Minister may for good reasons waive the fee.

4. (a) An application for the assignment of an oil prospecting licence or oil mining lease (or of an interest in the same) shall be made to the Minister in writing and accompanied by the prescribed fee; and the applicant shall furnish in respect of the assignee all such information as is required to be furnished in the case of an applicant for a new licence or lease.

(b) Application for the assignment or takeover of an oil prospecting licence or oil mining lease (or of an interest in the same) shall be made to the Minister in writing and accompanied by the prescribed fees at the discretion of the Minister; and the applicant shall furnish in respect of the assignment, or takeover, all such information as is required to be furnished in the case of an applicant for a new licence or lease.

5. All grants and renewals of oil prospecting licences and oil mining leases and all surrenders, determinations or assignments thereof shall be published in the Federal Gazette with the name of the licensee or lessee and the situation of the relevant area.

6. (1) The holder of an oil exploration licence may remove for examination and analysis samples and specimens of rock and petroleum found by him in the course of his operations.

(2) The Director of Petroleum Resources shall be given particulars of all such samples and specimens and provided, if he so requests, with representative samples and specimens not exceeding one half of the samples and specimens removed.

7. The holder of an oil exploration licence, oil prospecting licence or oil mining lease may not export samples or specimens abroad except with the written permission of the Director of Petroleum Resources and subject to such conditions as he may prescribe.

8. If the law of the State in which the relevant area is situated provides for an oil exploration licence, oil prospecting licence or oil mining lease to be 'registrable', the licensee or lessee shall register the licence or lease accordingly at his own expense and supply one copy of the registered licence or lease to the Director of Petroleum Resources.

9. The holder of an oil exploration licence, oil prospecting licence or oil mining lease shall—

(a) appoint a manager resident in Nigeria to supervise the operations under the licence or lease; and

(b) notify the name and address of the manager (and changes therein) to the Director of Petroleum Resources, and any notices required to be served on the licensee or lessee shall be sufficiently served if delivered or posted to the manager at the address notified.

10. Oil exploration licences shall be in the appropriate form in the Schedule to these Regulations.

11. Subject to the rights of the owners and occupiers of the relevant area, the licensee of an oil exploration licence may, with the approval of the Director of Petroleum Resources, bring and erect upon the relevant area temporary structures, machinery and other things necessary for his operations, and may dismantle and remove the same.

12. (1) As soon as possible (but not more than three months) after the grant of an oil exploration licence, the licensee shall commence to examine the relevant area by geological and geophysical methods, and shall continue the examination during the subsistence of the licence.

(2) Work under paragraph (1) of this regulation shall be supervised continuously by a qualified petroleum geologist and shall be carried out to the satisfaction of the Director of Petroleum Resources.

13. (1) The licensee of an oil exploration licence shall report without delay to the Director of Petroleum the discovery of any hydrocarbons or other economic minerals in the relevant area.

(2) In addition to reports and information required to be submitted under Part V of these Regulations, the licensee of an oil exploration licence shall within two months of the expiration of the licence forward to the Director of Petroleum Resources a report in triplicate on the work done and the conclusions reached on the relevant area, the report in question being accompanied by all necessary data, maps, plans and sections.

Appendix 114: Data on Financial Variables

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
JV_S	1	1999m1	20241025.00	45011285.47	11.32	229128403.00	12424000.00	57435285.47	1219000.00	13643000	58654285.47	171693117.5	2.83	74.9331	0.67403	0
JV_S	1	1999m2	18096707.00	40242825.89	10.75	194539600.25	6901000.00	47143825.89	1193000.00	8094000	48336825.89	147395774.4	2.60	75.7665	0.44726	0
JV_S	1	1999m3	23319237.00	51856505.97	12.86	299885387.82	20910000.00	72766505.97	1212000.00	22122000	73978505.97	227118881.9	3.12	75.7352	0.94866	0
JV_S	1	1999m4	22270228.00	49523756.34	15.73	350310686.44	17469000.00	66992756.34	9319000.00	26788000	76311756.34	283317930.1	3.00	80.8762	1.20286	0
JV_S	1	1999m5	25048858.00	55702776.82	16.12	403787590.96	24703000.00	80405776.82	10958000.00	35661000	91363776.82	323381814.1	3.20	80.0871	1.42366	0
JV_S	1	1999m6	20752569.00	46148839.18	16.24	337021720.56	18655000.00	64803839.18	14049000.00	32704000	78852839.18	272217881.4	3.12	80.7716	1.5759	0
JV_S	1	1999m7	20559334.00	45719129.93	18.75	385487512.50	24942000.00	70661129.93	15816000.00	40758000	86477129.93	314826382.6	3.43	81.6697	1.98246	0
JV_S	1	1999m8	20679444.00	45986226.36	20.21	417931563.24	28009000.00	73995226.36	20383000.00	48392000	94378226.36	343936336.9	3.57	82.2949	2.3401	0
JV_S	1	1999m9	21971021.00	48858390.24	22.37	491491739.77	31998000.00	80856390.24	27009000.00	59007000	107865390.2	410635349.5	3.68	83.5488	2.68567	0
JV_S	1	1999m10	21299278.00	47364591.59	22.19	472630978.82	25700000.00	73064591.59	38436000.00	64136000	111500591.6	399566387.2	3.43	84.5409	3.01118	0
JV_S	1	1999m11	20676849.00	45980455.69	24.22	500793282.78	33677000.00	79657455.69	70239000.00	103916000	149896455.7	421135827.1	3.85	84.0937	5.02572	0
JV_S	1	1999m12	22859000.00	50833046.98	25.01	571703590.00	28401000.00	79234046.98	70809000.00	99210000	150043047	492469543	3.46	86.1407	4.34008	0
JV_S	1	2000m1	20864.00	34162.57	25.21	525981.44	41548000.00	41582162.57	34481000.00	76029000	76063162.57	-41056181.13	1993.01	-7805.6	3644.03	0
JV_S	1	2000m2	20582650.00	33701885.40	27.15	558818947.50	32551000.00	66252885.40	38254000.00	70805000	104506885.4	492566062.1	3.21	88.1441	3.44003	0
JV_S	1	2000m3	23404214.00	38321894.32	27.49	643381842.86	39882000.00	78203894.32	44703000.00	84585000	122906894.3	565177948.5	3.34	87.8449	3.61409	0
JV_S	1	2000m4	22216571.00	36377256.08	23.45	520978589.95	37667000.00	74044256.08	49878000.00	87545000	123922256.1	446934333.9	3.33	85.7875	3.94053	0
JV_S	1	2000m5	22929979.00	37545385.29	27.23	624383328.17	40700000.00	78245385.29	52855000.00	93555000	131100385.3	546137942.9	3.41	87.4684	4.08003	0
JV_S	1	2000m6	23378014.00	38278994.63	29.62	692456774.68	26417000.00	64695994.63	60958000.00	87375000	125653994.6	627760780.1	2.76	90.657	3.73749	0
JV_S	1	2000m7	23931532.00	39185321.08	28.16	673911941.12	31228000.00	70413321.08	71753000.00	102981000	142166321.1	603498620	2.94	89.5516	4.30315	0
JV_S	1	2000m8	27394911.00	44856233.34	29.41	805684332.51	54728000.00	99584233.34	84376000.00	139104000	183960233.3	706100099.2	3.63	87.6398	5.07773	0
JV_S	1	2000m9	23354428.00	38240375.08	32.08	749210050.24	30681000.00	68921375.08	99948000.00	130629000	168869375.1	680288675.2	2.95	90.8008	5.59333	0

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JV_S	1	2000m10	26314888.00	43087811.32	31.4	826287483.20	48347000.00	91434811.32	124313000.00	172660000	215747811.3	734852671.9	3.47	88.9343	6.5613	0
JV_S	1	2000m11	25536879.00	41813904.89	32.33	825607298.07	49633000.00	91446904.89	176254000.00	225887000	267700904.9	734160393.2	3.58	88.9237	8.84552	0
JV_S	1	2000m12	26799311.00	43881002.11	25.28	677486582.08	36903000.00	80784002.11	176128000.00	213031000	256912002.1	596702580	3.01	88.0759	7.94912	0
JV_S	1	2001m1	26689986.00	46315077.55	25.95	692605136.70	49235000.00	95550077.55	52322000.00	101557000	147872077.5	597055059.2	3.58	86.2042	3.80506	0
JV_S	1	2001m2	24031150.00	41701204.93	27.24	654608526.00	17760000.00	59461204.93	52276000.00	70036000	111737204.9	595147321.1	2.47	90.9165	2.91438	0
JV_S	1	2001m3	25675304.00	44554301.97	25.02	642396106.08	54578000.00	99132301.97	57356000.00	111934000	156488302	543263804.1	3.86	84.5684	4.3596	0
JV_S	1	2001m4	5764797.00	10003640.32	25.66	147924691.02	27736000.00	37739640.32	59808000.00	87544000	97547640.32	110185050.7	6.54	74.4873	15.186	0
JV_S	1	2001m5	26121163.00	45328000.17	27.55	719638040.65	46194000.00	91522000.17	61836000.00	108030000	153358000.2	628116040.5	3.50	87.2822	4.13573	0
JV_S	1	2001m6	22496565.00	39038242.75	26.97	606732358.05	28431000.00	67469242.75	55774000.00	84205000	123243242.8	539263115.3	2.99	88.8799	3.74302	0
JV_S	1	2001m7	22861397.00	39671334.97	24.8	566962645.60	33521000.00	73192334.97	57546000.00	91067000	130738335	493770310.6	3.20	87.0904	3.98344	0
JV_S	1	2001m8	25903317.00	44949972.46	25.81	668564611.77	28688000.00	73637972.46	59046000.00	87734000	132683972.5	594926639.3	2.84	88.9857	3.38698	0
JV_S	1	2001m9	25846761.00	44851830.95	25.03	646944427.83	23668000.00	68519830.95	47916000.00	71584000	116435830.9	578424596.9	2.65	89.4087	2.76955	0
JV_S	1	2001m10	28257977.00	49036009.09	20.73	585787863.21	40937000.00	89973009.09	45668000.00	86605000	135641009.1	495814854.1	3.18	84.6407	3.0648	0
JV_S	1	2001m11	25330272.00	43955568.65	18.69	473422783.68	21382000.00	65337568.65	80518000.00	101900000	145855563.7	408085215	2.57	86.1989	4.02285	0
JV_S	1	2001m12	25478939.00	44213550.19	18.52	471869950.28	30525000.00	74738550.19	87198000.00	117723000	161936550.2	397131400.1	2.93	84.1612	4.6204	0
JV_S	1	2002m1	22751350.00	50646598.97	19.15	435688352.50	27054000.00	77700598.97	5647000.00	32701000	83347598.97	357987753.5	3.41	82.166	1.43732	0
JV_S	1	2002m2	17632649.00	39251899.45	19.98	352300327.02	23138000.00	62389899.45	12011000.00	35149000	74400899.45	289910427.6	3.53	82.2907	1.9934	0
JV_S	1	2002m3	19990462.00	44500608.19	23.64	472574521.68	33159000.00	77659608.19	13487000.00	46646000	91146608.19	394914913.5	3.88	83.5667	2.33341	0
JV_S	1	2002m4	19846518.00	44180175.60	25.43	504696952.74	27998000.00	72178175.60	16405000.00	44403000	88583175.6	432518777.1	3.63	85.6987	2.23732	0
JV_S	1	2002m5	20529257.00	45700015.45	25.69	527396612.33	31018000.00	76718015.45	27504000.00	58522000	104222015.4	450678596.9	3.73	85.4534	2.85066	0
JV_S	1	2002m6	19905515.00	44311508.35	24.49	487486062.35	21049000.00	65360508.35	29121000.00	50170000	94481508.35	422125554	3.28	86.5923	2.52041	0
JV_S	1	2002m6	22116370.00	49233075.05	25.75	569496527.50	25802000.00	75035075.05	32732000.00	58534000	107767075	494461452.5	3.39	86.8243	2.64664	0

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JV_S	1	2002m8	24504729.00	54549781.99	26.78	656236642.62	34190000.00	88739781.99	45203000.00	79393000	133942782	567496860.6	3.62	86.4775	3.23991	0
JV_S	1	2002m9	23487471.00	52285272.06	28.28	664225679.88	35475000.00	87760272.06	59225000.00	94700000	146985272.1	576465407.8	3.73	86.7876	4.03194	0
JV_S	1	2002m10	22030495.00	49041909.40	27.53	606499527.35	35401000.00	84442909.40	53289000.00	88690000	137731909.4	522056618	3.83	86.077	4.02578	0
JV_S	1	2002m11	23857896.00	53109872.20	24.79	591437241.84	36900000.00	90009872.20	80689000.00	117589000	170698872.2	501427369.6	3.77	84.7812	4.92872	0
JV_S	1	2002m12	25750013.00	57321898.78	27.89	718167862.57	35775000.00	93096898.78	83863000.00	119638000	176959898.8	625070963.8	3.61	87.0369	4.64613	0
JV_S	1	2003m1	27857392.00	55588788.57	30.77	857171951.84	55906000.00	111494788.57	45064000.00	100970000	156558788.6	745677163.3	4.00	86.9927	3.62453	1
JV_S	1	2003m2	25581434.00	51047166.44	32.88	841117549.92	51459000.00	102506166.44	54342000.00	105801000	156848166.4	738611383.5	4.00	87.8131	4.13585	1
JV_S	1	2003m3	26089962.00	52061922.43	30.36	792091246.32	50945000.00	103006922.43	50711000.00	101656000	153717922.4	689084323.9	3.94	86.9956	3.89636	1
JV_S	1	2003m4	23291843.00	46478339.97	25.49	593709078.07	41894000.00	88372339.97	55046000.00	96940000	143418340	505336738.1	3.79	85.1152	4.16197	1
JV_S	1	2003m5	26145120.00	52171988.96	26.06	681341827.20	35274000.00	87445988.96	63068000.00	98342000	150513989	593895838.2	3.34	87.1656	3.76139	1
JV_S	1	2003m6	25693639.00	51271068.95	27.91	717109464.49	41642000.00	92913068.95	69872000.00	111514000	162785069	624196395.5	3.61	87.0434	4.34014	1
JV_S	1	2003m7	27676368.00	55227559.32	28.59	791267361.12	54589000.00	109816559.32	77571000.00	132160000	187387559.3	681450801.8	3.96	86.1214	4.77519	1
JV_S	1	2003m8	28853662.00	57576822.57	29.68	856376688.16	50055000.00	107631822.57	85590000.00	135645000	193221822.6	748744865.6	3.73	87.4317	4.70114	1
JV_S	1	2003m9	28540857.00	56952627.35	26.88	767178236.16	46972000.00	103924627.35	99266000.00	146238000	203190627.3	663253608.8	3.64	86.4537	5.12381	1
JV_S	1	2003m10	31759469.00	63375293.98	29.01	921342195.69	63542000.00	126917293.98	148284000.00	211826000	275201294	794424901.7	3.99	86.2247	6.6697	1
JV_S	1	2003m11	30941305.00	61742666.43	29.12	901010801.60	57142000.00	118884666.43	222818000.00	279960000	341702666.4	782126135.2	3.84	86.8054	9.0481	1
JV_S	1	2003m12	31815168.00	63486440.06	29.95	952864281.60	54219000.00	117705440.06	223719000.00	277938000	341424440.1	835158841.5	3.69	87.6472	8.73602	1
JV_S	1	2004m1	32672045.00	83753984.06	31.4	1025902213.00	81359000.00	165112984.06	112359000.00	193718000	277471984.1	860789228.9	5.05	83.9056	5.92917	1
JV_S	1	2004m2	31238331.00	80078693.47	31.32	978384526.92	63787000.00	143865693.47	113539000.00	177326000	257404693.5	834518833.4	4.60	85.2956	5.67655	1
JV_S	1	2004m3	33216705.00	85150206.58	33.67	1118406457.35	50903000.00	136053206.58	124744000.00	175647000	260797206.6	982353250.8	4.09	87.8351	5.28791	1
JV_S	1	2004m4	30177390.00	77358997.30	33.71	1017279816.90	64624000.00	141982997.30	137129000.00	201753000	279111997.3	875296819.6	4.70	86.0429	6.68557	1
JV_S	1	2004m5	30617175.00	78486375.34	37.63	1152124295.25	83814000.00	162300375.34	146636000.00	230450000	308936375.3	989823919.9	5.30	85.9129	7.52682	1

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JV_S	1	2004m6	30201710.00	77421341.03	35.54	1073368773.40	62502000.00	139923341.03	162356000.00	224858000	302279341	933445432.4	4.63	86.9641	7.44521	1
JV_S	1	2004m7	31887503.00	81742829.93	37.93	1209492988.79	80440000.00	162182829.93	184797000.00	265237000	346979829.9	1047310159	5.08	86.5908	8.3179	1
JV_S	1	2004m8	31119853.00	79774978.03	42.08	1309523414.24	85502000.00	165276978.03	207650000.00	293152000	372926978	1144246436	5.31	87.3788	9.4201	1
JV_S	1	2004m9	29918507.00	76695357.10	41.65	1246105816.55	71135000.00	147830357.10	218928000.00	290063000	366758357.1	1098275459	4.94	88.1366	9.6951	1
JV_S	1	2004m10	29740211.00	76238299.69	46.87	1393923689.57	89662000.00	165900299.69	276188000.00	365850000	442088299.7	1228023390	5.57	88.0983	12.3015	1
JV_S	1	2004m11	29644764.00	75993623.65	42.23	1251898383.72	78535000.00	154528623.65	287116000.00	365651000	441644623.6	1097369760	5.21	87.6565	12.3344	1
JV_S	1	2004m12	27702320.00	71014216.21	39.09	1082883688.80	75302000.00	146316216.21	281166000.00	356468000	427482216.2	936567472.6	5.28	86.4883	12.8678	1
JV_S	1	2005m1	31476569.00	80564917.15	43.822	1379366206.72	98311000.00	178875917.15	258761000.00	357072000	437636917.1	1200490290	5.68	87.032	11.3441	1
JV_S	1	2005m2	28321588.00	72489679.25	46.9836	1330650161.96	98311000.00	170800679.25	258761000.00	357072000	429561679.3	1159849483	6.03	87.1641	12.6078	1
JV_S	1	2005m3	33460587.00	85643051.48	53.2387	1781398153.12	98311000.00	183954051.48	258761000.00	357072000	442715051.5	1597444102	5.49	89.6736	10.6714	1
JV_S	1	2005m4	29445299.00	75365840.36	52.1535	1535675401.40	98311000.00	173676840.36	258761000.00	357072000	432437840.4	1361998561	5.89	88.6905	12.1266	1
JV_S	1	2005m5	32298233.00	82667982.83	48.7608	1574887679.67	98311000.00	180978982.83	258761000.00	357072000	439739982.8	1393908697	5.60	88.5085	11.0555	1
JV_S	1	2005m6	32531201.00	83264269.15	54.3858	1769235391.35	98311000.00	181575269.15	258761000.00	357072000	440336269.2	1587660122	5.58	89.7371	10.9763	1
JV_S	1	2005m7	30744129.00	78690222.10	58.7619	1806583433.89	98311000.00	177001222.10	258761000.00	357072000	435762222.1	1629582212	5.75	90.2024	11.6143	1
JV_S	1	2005m8	31131186.00	79680902.35	65.3707	2035067420.65	98311000.00	177991902.35	258761000.00	357072000	436752902.3	1857075518	5.71	91.2538	11.4699	1
JV_S	1	2005m9	30281288.00	77505571.17	63.8832	1934465577.56	98311000.00	175816571.17	258761000.00	357072000	434577571.2	1758649006	5.80	90.9114	11.7918	1
JV_S	1	2005m10	29560664.00	75661119.42	60.87		98311000.00	173972119.42	258761000.00	357072000	432733119.4		5.88		12.0793	1
JV_S	1	2005m11	29472874.00	75436419.13	55.1381	1625078273.90	98311000.00	173747419.13	258761000.00	357072000	432508419.1	1451330855	5.89	89.3084	12.1153	1
JV_S	1	2005m12	30060556.00	76940603.14	58.3034	1752632620.69	98311000.00	175251603.14	258761000.00	357072000	434012603.1	1577381018	5.82	90.0007	11.8784	1
JV_S	1	2006m1	22066694.00	99537353.36	63.4921	1401060742.12	79960.00	99617313.36	224268.00	304228	99841581.36	1301443429	4.51	92.8899	0.01379	1
JV_S	1	2006m2	17310372.00	78082771.01	60.2523	1042989726.86	85034.00	78167805.01	207358.00	292392	78375163.01	964821921.8	4.51	92.5054	0.01689	1
JV_S	1	2006m3	14187623.00	63996829.06	62.1603	881906901.97	40473.00	64037302.06	195723.00	236196	64233025.06	817869599.9	4.51	92.7388	0.01665	1

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JV_S	1	2006m4	0.00	0.00		0.00	58079.00	58079.00	175333.00	233412	233412	-58079				1
JV_S	1	2006m5	12988717.00	58588863.10	70.0808	910259678.33	48777.00	58637640.10	131761.00	180538	58769401.1	851622038.2	4.51	93.5581	0.0139	1
JV_S	1	2006m6	0.00	0.00		0.00	58387.00	58387.00	93254.00	151641	151641	-58387				1
JV_S	1	2006m7	11647590.00	52539373.67	74.2877	865272671.64	35997.00	52575370.67	5911.00	41908	52581281.67	812697301	4.51	93.9238	0.0036	1
JV_S	1	2006m8	11533220.00	52023479.12	69.6639	803449084.76	59518.00	52082997.12	44091.00	103609	52127088.12	751366087.6	4.51	93.5176	0.00898	1
JV_S	1	2006m9	11951371.00	53909654.00	63.1611	754861738.87	44783.00	53954437.00	29751.00	74534	53984188	700907301.9	4.51	92.8524	0.00624	1
JV_S	1	2006m10	11132864.00	50217573.05	58.4447	650656896.62	44332.00	50261905.05	9461.00	53793	50271366.05	600394991.6	4.51	92.2752	0.00483	1
JV_S	1	2006m11	11512691.00	51930877.92	60.4533	695980162.83	60009.00	51990886.92	55203.00	115212	52046089.92	643989275.9	4.51	92.5298	0.01001	1
JV_S	1	2006m12	12402105.00	55942802.66	59.084	732765971.82	24968.00	55967770.66	55203.00	80171	56022973.66	676798201.2	4.51	92.3621	0.00646	1
JV_S	1	2007m1	12128498.00	70302449.44	54.5782	661951589.54	53799.00	70356248.44	32667.00	86466	70388915.44	591595341.1	5.80	89.3714	0.00713	1
JV_S	1	2007m2	11156968.00	64671006.98	58.5746	653514937.81	20615.00	64691621.98	33617.00	54232	64725238.98	588823315.8	5.79	90.101	0.00486	1
JV_S	1	2007m3	9142805.00	52995975.78	64.3595	588426358.40	58741.00	53054716.78	35574.00	94315	53090290.78	535371641.6	5.80	90.9836	0.01032	1
JV_S	1	2007m4	12002163.00	69570152.67	68.6	823348381.80	42059.00	69612211.67	30884.00	72943	69643095.67	753736170.1	5.79	91.5452	0.00608	1
JV_S	1	2007m5	9586421.00	55567381.69	68.88	660312678.48	35760.00	55603141.69	33733.00	69493	55636874.69	604709536.8	5.80	91.5793	0.00725	1
JV_S	1	2007m6	9586421.00	55567381.69	68.88	660312678.48	35933.00	55603314.69	39220.00	75153	55642534.69	604709363.8	5.80	91.5792	0.00784	1
JV_S	1	2007m7	9586421.00	55567381.69	68.88	660312678.48	46950.00	55614331.69	76671.00	123621	55691002.69	604698346.8	5.80	91.5776	0.0129	1
JV_S	1	2007m8	9586421.00	55567381.69	68.88	660312678.48	70933.00	55638314.69	76394.00	147327	55714708.69	604674363.8	5.80	91.5739	0.01537	1
JV_S	1	2007m9	9586421.00	55567381.69	68.88	660312678.48	71156.00	55638537.69	89657.00	160813	55728194.69	604674140.8	5.80	91.5739	0.01678	1
JV_S	1	2007m10	9586421.00	55567381.69	68.88	660312678.48	67980.00	55635361.69	181284.00	249264	55816645.69	604677316.8	5.80	91.5744	0.026	1
JV_S	1	2007m11	12680000.00	73499213.09	68.88	873398400.00	38497.00	73537710.09	206610.00	245107	73744320.09	799860689.9	5.79	91.5803	0.01933	1
JV_S	1	2007m12	0.00	0.00	68.88	0.00	114784.00	114784.00	206610.00	321394	321394	-114784				1
JV_C	1	1999m1	13094886.00	27401405.52	11.32	148234109.52	10730000.00	38131405.52	0.00	10730000	38131405.52	110102704	2.91	74.2762	0.8194	0

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JV_C	1	1999m2	9983571.00	20890894.16	10.75	107323388.25	7304000.00	28194894.16	0.00	7304000	28194894.16	79128494.09	2.82	73.729	0.7316	0
JV_C	1	1999m3	13296995.00	27824324.11	12.86	170999355.70	11268000.00	39092324.11	1187000.00	12455000	40279324.11	131907031.6	2.93	77.1389	0.93668	0
JV_C	1	1999m4	13115967.00	27445518.09	15.73	206314160.91	14438000.00	41883518.09	1187000.00	15625000	43070518.09	164430642.8	3.19	79.6992	1.1913	0
JV_C	1	1999m5	13412852.00	28066758.03	16.12	216215174.24	15362000.00	43428758.03	4221000.00	19583000	47649758.03	172786416.2	3.23	79.9141	1.46002	0
JV_C	1	1999m6	14055393.00	29411292.57	16.24	228259582.32	13679000.00	43090292.57	4221000.00	17900000	47311292.57	185169289.7	3.06	81.1222	1.27353	0
JV_C	1	1999m7	12406754.00	25961470.57	18.75	232626637.50	17143000.00	43104470.57	8806000.00	25949000	51910470.57	189522166.9	3.47	81.4705	2.09152	0
JV_C	1	1999m8	13559212.00	28373020.32	20.21	274031674.52	21081000.00	49454020.32	8806000.00	29887000	58260020.32	224577654.2	3.64	81.9532	2.20418	0
JV_C	1	1999m9	12253315.00	25640395.29	22.37	274106656.55	20295000.00	45935395.29	16881000.00	37176000	62816395.29	228171261.3	3.74	83.2418	3.03395	0
JV_C	1	1999m10	12103479.00	25326859.38	22.19	268576199.01	20163000.00	45489859.38	30000000.00	50163000	75489859.38	223086339.6	3.75	83.0626	4.14451	0
JV_C	1	1999m11	12672487.00	26517524.11	24.22	306927635.14	23118000.00	49635524.11	30000000.00	53118000	79635524.11	257292111	3.91	83.8283	4.1916	0
JV_C	1	1999m12	13146214.00	27508810.76	25.01	328786812.14	25567000.00	53075810.76	45269000.00	70836000	98344810.76	275711001.4	4.03	83.8571	5.38832	0
JV_C	1	2000m1	12940.00	26762.33	25.21	326217.40	24360000.00	24386762.33	65290000.00	89650000	89676762.33	-24060544.93	1884.6	-7375.6	6928.13	0
JV_C	1	2000m2	12256144.00	25347987.21	27.15	332754309.60	25096000.00	50443987.21	65290000.00	90386000	115733987.2	282310322.4	4.11	84.8405	7.37475	0
JV_C	1	2000m3	12780270.00	26431977.34	27.49	351329622.30	28254000.00	54685977.34	29693000.00	57947000	84378977.34	296643645	4.27	84.4346	4.5341	0
JV_C	1	2000m4	12072024.00	24967192.78	23.45	283088962.80	21552000.00	46519192.78	37252000.00	58804000	83771192.78	236569770	3.85	83.5673	4.8711	0
JV_C	1	2000m5	13035775.00	26960409.25	27.23	354964153.25	27580000.00	54540409.25	37252000.00	64832000	91792409.25	300423744	4.18	84.635	4.97339	0
JV_C	1	2000m6	12281052.00	25399501.59	29.62	363764760.24	20517000.00	45916501.59	37252000.00	57769000	83168501.59	317848258.6	3.73	87.3774	4.70391	0
JV_C	1	2000m7	13106792.00	27107285.62	28.16	369087262.72	26519000.00	53626285.62	53406000.00	79925000	107032285.6	315460977.1	4.09	85.4706	6.09798	0
JV_C	1	2000m8	13007497.00	26901925.08	29.41	382550486.77	27263000.00	54164925.08	53406000.00	80669000	107570925.1	328385561.7	4.16	85.8411	6.20173	0
JV_C	1	2000m9	12708286.00	26283101.03	32.08	407681814.88	29919000.00	56202101.03	67550000.00	97469000	123752101	351479713.8	4.42	86.2142	7.66972	0
JV_C	1	2000m10	12911544.00	26703476.41	31.4	405422481.60	28664000.00	55367476.41	67550000.00	96214000	122917476.4	350055005.2	4.28	86.3433	7.45178	0
JV_C	1	2000m11	13102331.00	27098059.44	32.33	423598361.23	30757000.00	57855059.44	85019000.00	115776000	142874059.4	365743301.8	4.41	86.342	8.83629	0

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JV_C	1	2000m12	13620273.00	28169259.91	25.28	344320501.44	24536000.00	52705259.91	104374000.00	128910000	157079259.9	291615241.5	3.86	84.693	9.46457	0
JV_C	1	2001m1	13742900.00	37556026.86	25.95	356628255.00	25386000.00	62942026.86	90099000.00	115485000	153041026.9	293686228.1	4.57	82.3508	8.40325	0
JV_C	1	2001m2	12683105.00	34659863.06	27.24	345487780.20	24573000.00	59232863.06	90099000.00	114672000	149331863.1	286254917.1	4.67	82.8553	9.04132	0
JV_C	1	2001m3	14097132.00	38524057.37	25.02	352710242.64	24386000.00	62910057.37	54710000.00	79096000	117620057.4	289800185.3	4.46	82.1638	5.61079	0
JV_C	1	2001m4	13443161.00	36736912.56	25.66	344951511.26	24788000.00	61524912.56	54710000.00	79498000	116234912.6	283426598.7	4.57	82.1642	5.91364	0
JV_C	1	2001m5	12226294.00	33411508.92	27.55	336834399.70	25211000.00	58622508.92	54710000.00	79921000	113332503.9	278211890.8	4.79	82.596	6.53681	0
JV_C	1	2001m6	13565211.00	37070445.73	26.97	365853740.67	26867000.00	63937445.73	54710000.00	81577000	118647445.7	301916294.9	4.71	82.5238	6.01369	0
JV_C	1	2001m7	14035142.00	38354653.67	24.8	348071521.60	24453000.00	62807653.67	54710000.00	79163000	117517653.7	285263867.9	4.47	81.9555	5.64034	0
JV_C	1	2001m8	13984324.00	38215780.35	25.81	360935402.44	25399000.00	63614780.35	54710000.00	80109000	118324780.4	297320622.1	4.54	82.375	5.72849	0
JV_C	1	2001m9	13453749.00	36765847.01	25.03	336747337.47	24331000.00	61096847.01	54710000.00	79041000	115806847	275650490.5	4.54	81.8568	5.87502	0
JV_C	1	2001m10	12844142.00	35099938.29	20.73	266259063.66	18335000.00	53434938.29	54710000.00	73045000	108144938.3	212824125.4	4.16	79.9312	5.68703	0
JV_C	1	2001m11	13561244.00	37059604.88	18.69	253459650.36	17973000.00	55032604.88	40805000.00	58778000	95837604.88	198427045.5	4.05	78.2874	4.33426	0
JV_C	1	2001m12	12841375.00	35092376.75	18.52	237822265.00	16658000.00	51750376.75	40805000.00	57463000	92555376.75	186071888.3	4.02	78.2399	4.47483	0
JV_C	1	2002m1	772767.00	2146425.89	19.15	14798488.05	16815000.00	18961425.89	40805000.00	57620000	59766425.89	-4162937.837	24.53	-28.131	74.5632	0
JV_C	1	2002m2	10038076.00	33564069.75	19.98	200560758.48	14024000.00	47588069.75	25224000.00	39248000	72812069.75	152972688.7	4.74	76.2725	3.90991	0
JV_C	1	2002m3	10943959.00	36593048.63	23.64	258715190.76	18244000.00	54837048.63	15014000.00	33258000	69851048.63	203878142.1	5.01	78.8041	3.03894	0
JV_C	1	2002m4	10459932.00	34974619.37	25.43	265996070.76	18921000.00	53895619.37	21729000.00	40650000	75624619.37	212100451.4	5.15	79.7382	3.88626	0
JV_C	1	2002m5	10202621.00	34114254.85	25.69	262105333.49	18055000.00	52169254.85	21729000.00	39784000	73898254.85	209936078.6	5.11	80.0961	3.89939	0
JV_C	1	2002m6	10086885.00	33727271.22	24.49	247027813.65	17194000.00	50921271.22	21729000.00	38923000	72650271.22	196106542.4	5.04	79.3864	3.85877	0
JV_C	1	2002m6	5806420.00	19414784.86	25.75	149515315.00	10345000.00	29759784.86	22510000.00	32855000	52269784.86	119755530.1	5.12	80.0958	5.65839	0
JV_C	1	2002m8	11487129.00	38409232.91	26.78	307625314.62	22157000.00	60566232.91	18504000.00	40661000	79070232.91	247059081.7	5.27	80.3117	3.5397	0
JV_C	1	2002m9	11630177.00	38887539.01	28.28	328901405.56	23566000.00	62453539.01	18504000.00	42070000	80957539.01	266447866.5	5.36	81.0115	3.61731	0

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JV_C	1	2002m10	11566159.00	38673483.59	27.53	318416357.27	23020000.00	61693483.59	40597000.00	63617000	102290483.6	256722873.7	5.33	80.6249	5.50027	0
JV_C	1	2002m11	11667452.00	39012174.52	24.79	289236135.08	19753000.00	58765174.52	40597000.00	60350000	99362174.52	230470960.6	5.03	79.6826	5.17251	0
JV_C	1	2002m12	13215098.00	44187000.68	27.89	368569083.22	27586000.00	71773000.68	40597000.00	68183000	112370000.7	296796082.5	5.43	80.5266	5.15948	0
JV_C	1	2003m1	13586609.00	42313341.53	30.77	418059958.93	30210000.00	72523341.53	40597000.00	70807000	113120341.5	345536617.4	5.33	82.6524	5.21153	1
JV_C	1	2003m2	12790006.00	39832447.67	32.88	420535397.28	29726000.00	69558447.67	40597000.00	70323000	110155447.7	350976949.6	5.43	83.4595	5.49828	1
JV_C	1	2003m3	9713338.00	30250652.55	30.36	294896941.68	21457000.00	51707652.55	36054000.00	57511000	87761652.55	243189289.1	5.32	82.4659	5.92083	1
JV_C	1	2003m4	8334081.00	25955175.10	25.49	212435724.69	14684000.00	40639175.10	36054000.00	50738000	76693175.1	171796549.6	4.87	80.8699	6.08801	1
JV_C	1	2003m5	10827198.00	33719593.07	26.06	282156779.88	19235000.00	52954593.07	36054000.00	55289000	89008593.07	229202186.8	4.89	81.2322	5.10649	1
JV_C	1	2003m6	10320197.00	32140618.77	27.91	288036698.27	19760000.00	51900618.77	49074000.00	68834000	100974618.8	236136079.5	5.02	81.9812	6.66983	1
JV_C	1	2003m7	10488825.00	32665783.97	28.59	299875506.75	21376000.00	54041783.97	49074000.00	70450000	103115784	245833722.8	5.15	81.9786	6.71667	1
JV_C	1	2003m8	10169361.00	31670863.94	29.68	301826634.48	21440000.00	53110863.94	49074000.00	70514000	102184863.9	248715770.5	5.22	82.4035	6.93397	1
JV_C	1	2003m9	9977777.00	31074205.92	26.88	268202645.76	18980000.00	50054205.92	44660000.00	63640000	94714205.92	218148439.8	5.01	81.3372	6.37817	1
JV_C	1	2003m10	10372245.00	32302714.02	29.01	300898827.45	21429000.00	53731714.02	44650000.00	66079000	98381714.02	247167113.4	5.18	82.1429	6.37075	1
JV_C	1	2003m11	10090825.00	31426276.01	29.12	293844824.00	20509000.00	51935276.01	44650000.00	65159000	96585276.01	241909548	5.14	82.3256	6.45725	1
JV_C	1	2003m12	9977623.00	31073726.32	29.95	298829808.85	21056000.00	52129726.32	44650000.00	65706000	96779726.32	246700082.5	5.22	82.5554	6.58534	1
JV_C	1	2004m1	10572816.00	34411262.18	31.4	331986422.40	23327000.00	57738262.18	24585000.00	47912000	82323262.18	274248160.2	5.46	82.6082	4.53162	1
JV_C	1	2004m2	9766412.00	31786665.34	31.32	305884023.84	21261000.00	53047665.34	24585000.00	45846000	77632665.34	252836358.5	5.43	82.6576	4.69425	1
JV_C	1	2004m3	10455884.00	34030684.51	33.67	352049614.28	24916000.00	58946684.51	31656000.00	56572000	90602684.51	293102929.8	5.63	83.2561	5.41054	1
JV_C	1	2004m4	10626391.00	34585632.32	33.71	358215640.61	25575000.00	60160632.32	31656000.00	57231000	91816632.32	298055008.3	5.66	83.2055	5.38574	1
JV_C	1	2004m5	10995876.00	35788192.28	37.63	413774813.88	29934000.00	65722192.28	31656000.00	61590000	97378192.28	348052621.6	5.97	84.1164	5.60119	1
JV_C	1	2004m6	9836023.00	32013227.72	35.54	349572257.42	24938000.00	56951227.72	31656000.00	56594000	88607227.72	292621029.7	5.79	83.7083	5.75375	1
JV_C	1	2004m7	10756161.00	35007993.73	37.93	407981186.73	29331000.00	64338993.73	72380000.00	101711000	136718993.7	343642193	5.98	84.2299	9.45607	1

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JV_C	1	2004m8	10661200.00	34698924.90	42.08	448623296.00	32371000.00	67069924.90	72380000.00	104751000	139449924.9	381553371.1	6.29	85.0498	9.82544	1
JV_C	1	2004m9	10335041.00	33637377.73	41.65	430454457.65	32069000.00	65706377.73	81461000.00	113530000	147167377.7	364748079.9	6.35763	84.7356	10.985	1
JV_C	1	2004m10	10678780.00	34756142.39	46.87	500514418.60	38166000.00	72922142.39	81461000.00	119627000	154383142.4	427592276.2	6.8287	85.4306	11.2023	1
JV_C	1	2004m11	10166759.00	33089671.61	42.23	429342232.57	33466000.00	66555671.61	115029000.00	148495000	181584671.6	362786561	6.5464	84.4982	14.6059	1
JV_C	1	2004m12	9935109.00	32335722.16	39.09	388363410.81	29025000.00	61360722.16	108531000.00	137556000	169891722.2	327002688.7	6.17615	84.2002	13.8454	1
JV_C	1	2005m1	10869798.00	40976731.52	43.822	476336287.96	45217000.00	86193731.52	107035000.00	152252000	193228731.5	390142556.4	7.92965	81.9049	14.0069	1
JV_C	1	2005m2	10101819.00	38081620.74	46.9836	474619823.17	45217000.00	83298620.74	107035000.00	152252000	190333620.7	391321202.4	8.2459	82.4494	15.0717	1
JV_C	1	2005m3	11171882.00	42115521.30	53.2387	594776474.23	45217000.00	87332521.30	107035000.00	152252000	194367521.3	507443952.9	7.81717	85.3167	13.6281	1
JV_C	1	2005m4	10954623.00	41296502.98	52.1535	571321930.63	45217000.00	86513502.98	107035000.00	152252000	193548503	484808427.6	7.89744	84.8573	13.8984	1
JV_C	1	2005m5	11225432.00	42317392.95	48.7608	547361044.67	45217000.00	87534392.95	107035000.00	152252000	194569392.9	459826651.7	7.79786	84.0079	13.5631	1
JV_C	1	2005m6	10957270.00	41306481.59	54.3858	595919894.77	45217000.00	86523481.59	107035000.00	152252000	193558481.6	509396413.2	7.89645	85.4807	13.8951	1
JV_C	1	2005m7	11240021.00	42372390.25	58.7619	660484990.00	45217000.00	87589390.25	107035000.00	152252000	194624390.2	572895599.8	7.79264	86.7386	13.5455	1
JV_C	1	2005m8	10947219.00	41268591.54	65.3707	715627369.08	45217000.00	86485591.54	107035000.00	152252000	193520591.5	629141777.5	7.90023	87.9147	13.9078	1
JV_C	1	2005m9	10530538.00	39697796.44	63.8832	672724465.16	45217000.00	84914796.44	107035000.00	152252000	191949796.4	587809668.7	8.06367	87.3775	14.4581	1
JV_C	1	2005m10	10579612.00	39882794.55	60.87		45217000.00	85099794.55	107035000.00	152252000	192134794.6		8.04375		14.3911	1
JV_C	1	2005m11	11359711.00	42823595.04	55.1381	626352881.09	45217000.00	88040595.04	107035000.00	152252000	195075595	538312286	7.75025	85.9439	13.4028	1
JV_C	1	2005m12	12038485.00	45382422.72	58.3034	701884606.35	45217000.00	90599422.72	107035000.00	152252000	197634422.7	611285183.6	7.52582	87.092	12.6471	1
JV_C	1	2006m1	12482856.00	65354136.57	63.4921	792562741.44	51153.00	65405289.57	46920.00	98073	65452209.57	727157451.9	5.23961	91.7476	0.00786	1
JV_C	1	2006m2	11085059.00	58035954.25	60.2523	667900300.39	51924.00	58087878.25	46920.00	98844	58134798.25	609812422.1	5.2402	91.3029	0.00892	1
JV_C	1	2006m3	12659393.00	66278398.07	62.1603	786911666.70	58132.00	66336530.07	112274.00	170406	66448804.07	720575136.6	5.2401	91.57	0.01346	1
JV_C	1	2006m4	323354.00	1692923.60		0.00	52266.00	1745189.60	112274.00	164540	1857463.597	-1745189.597	5.39715		0.50885	1
JV_C	1	2006m5	12232609.00	64043965.51	70.0808	857271024.81	58684.00	64102649.51	112274.00	170958	64214923.51	793168375.3	5.24031	92.5225	0.01398	1

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JV_C	1	2006m6	650359.00	3404962.05		0.00	70861.00	3475823.05	112274.00	183135	3588097.046	-3475823.046	5.34447		0.28159	1
JV_C	1	2006m7	11716877.00	61343844.68	74.2877	870419843.51	66760.00	61410604.68	125906.00	192666	61536510.68	809009238.8	5.24121	92.9447	0.01644	1
JV_C	1	2006m8	11786702.00	61709414.27	69.6639	821107629.46	63538.00	61772952.27	179123.00	242661	61952075.27	759334677.2	5.2409	92.4769	0.02059	1
JV_C	1	2006m9	11479986.00	60103599.12	63.1611	725088543.74	67462.00	60171061.12	112274.00	179736	60283335.12	664917482.6	5.24139	91.7016	0.01566	1
JV_C	1	2006m10	11524964.00	60339081.96	58.4447	673573063.49	67700.00	60406781.96	112274.00	179974	60519055.96	613166281.5	5.24139	91.0319	0.01562	1
JV_C	1	2006m11	11406559.00	59719171.21	60.4533	689564133.19	51770.00	59770941.21	214358.00	266128	59985299.21	629793192	5.24005	91.3321	0.02333	1
JV_C	1	2006m12	11754248.00	61539500.98	59.084	694487988.83	52668.00	61592168.98	69074.00	121742	61661242.98	632895819.9	5.23999	91.1313	0.01036	1
JV_C	1	2007m1	11130209.00	62488016.55	54.5782	607466772.84	51764.00	62539780.55	60455.00	112219	62600235.55	544926992.3	5.61892	89.7048	0.01008	1
JV_C	1	2007m2	9856947.00	55339577.83	58.5746	577366727.75	105831.00	55445408.83	218917.00	324748	55664325.83	521921318.9	5.62501	90.3968	0.03295	1
JV_C	1	2007m3	10280800.00	57719203.70	64.3595	661667147.60	52368.00	57771571.70	110696.00	163064	57882267.7	603895575.9	5.61937	91.2688	0.01586	1
JV_C	1	2007m4	10499270.00	58945753.62	68.6	720249922.00	50303.00	58996056.62	110696.00	160999	59106752.62	661253865.4	5.61906	91.8089	0.01533	1
JV_C	1	2007m5	10217705.00	57364971.23	68.88	703795520.40	54646.00	57419617.23	113382.00	168028	57532999.23	646375903.2	5.61962	91.8414	0.01644	1
JV_C	1	2007m6	10217705.00	57364971.23	68.88	703795520.40	63307.00	57428278.23	110696.00	174003	57538974.23	646367242.2	5.62047	91.8402	0.01703	1
JV_C	1	2007m7	10217705.00	57364971.23	68.88	703795520.40	60558.00	57425529.23	176860.00	237418	57602389.23	646369991.2	5.6202	91.8406	0.02324	1
JV_C	1	2007m8	10217705.00	57364971.23	68.88	703795520.40	66339.00	57431310.23	110696.00	177035	57542006.23	646364210.2	5.62076	91.8398	0.01733	1
JV_C	1	2007m9	10217705.00	57364971.23	68.88	703795520.40	64658.00	57429629.23	66889.00	131547	57496518.23	646365891.2	5.6206	91.84	0.01287	1
JV_C	1	2007m10	10217705.00	57364971.23	68.88	703795520.40	61658.00	57426629.23	66889.00	128547	57493518.23	646368891.2	5.62031	91.8404	0.01258	1
JV_C	1	2007m11	10450000.00	58669138.46	68.88	719796000.00	73383.00	58742521.46	66889.00	140272	58809410.46	661053478.5	5.62129	91.839	0.01342	1
JV_C	1	200m712	0.00	0.00	68.88	0.00	83444.00	83444.00	66889.00	150333	150333	-83444				1
JV_E	1	1999m1	4181299.00	10718876.26	11.32	47332304.68	7904000.00	18622876.26	1000000.00	8904000	19622876.26	28709428.42	4.45385	60.655	2.12948	0
JV_E	1	1999m2	3746527.00	9604326.15	10.75	40275165.25	5812000.00	15416326.15	1000000.00	6812000	16416326.15	24858839.1	4.11483	61.7225	1.81822	0
JV_E	1	1999m3	4328274.00	11095650.76	12.86	55661603.64	8585000.00	19680650.76	1000000.00	9585000	20680650.76	35980952.88	4.547	64.6423	2.21451	0

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JV_E	1	1999m4	4281115.00	10974757.36	15.73	67341938.95	10701000.00	21675757.36	1000000.00	11701000	22675757.36	45666181.59	5.06311	67.8124	2.73317	0
JV_E	1	1999m5	3905549.00	10011983.47	16.12	62957449.88	11415000.00	21426983.47	1000000.00	12415000	22426983.47	41530466.41	5.48629	65.9659	3.17881	0
JV_E	1	1999m6	4081166.00	10462182.53	16.24	66278135.84	10460000.00	20922182.53	1000000.00	11460000	21922182.53	45355953.31	5.12652	68.4328	2.80802	0
JV_E	1	1999m7	3019860.00	7741495.09	18.75	56622375.00	11631000.00	19372495.09	2000000.00	13631000	21372495.09	37249879.91	6.41503	65.7865	4.51379	0
JV_E	1	1999m8	3806464.00	9757976.32	20.21	76928637.44	13723000.00	23480976.32	2000000.00	15723000	25480976.32	53447661.12	6.16871	69.4769	4.13061	0
JV_E	1	1999m9	3618142.00	9275207.63	22.37	80937836.54	15468000.00	24743207.63	2000000.00	17468000	26743207.63	56194628.91	6.83865	69.4294	4.82789	0
JV_E	1	1999m10	3313939.00	8495374.78	22.19	73536306.41	14684000.00	23179374.78	2000000.00	16684000	25179374.78	50356931.63	6.99451	68.479	5.03449	0
JV_E	1	1999m11	3776811.00	9681960.03	24.22	91474362.42	16569000.00	26250960.03	5055000.00	21624000	31305960.03	65223402.39	6.95056	71.3024	5.72547	0
JV_E	1	1999m12	3328418.00	8532492.10	25.01	83243734.18	17990000.00	26522492.10	5055000.00	23045000	31577492.1	56721242.08	7.9685	68.1388	6.92371	0
JV_E	1	2000m1	4072185.00	10495510.30	25.21	102659783.85	18794000.00	29289510.30	5328000.00	24122000	34617510.3	73370273.55	7.19258	71.4693	5.9236	0
JV_E	1	2000m2	3894479.00	10037496.94	27.15	105735104.85	21350000.00	31387496.94	15928000.00	37278000	47315496.94	74347607.91	8.05949	70.315	9.57201	0
JV_E	1	2000m3	4469563.00	11519698.77	27.49	122868286.87	24394000.00	35913698.77	15928000.00	40322000	51841698.77	86954588.1	8.03517	70.7706	9.02146	0
JV_E	1	2000m4	4487210.00	11565181.54	23.45	105225074.50	17883000.00	29448181.54	15928000.00	33811000	45376181.54	75776892.96	6.56269	72.0141	7.53497	0
JV_E	1	2000m5	4437594.00	11437302.96	27.23	120835684.62	21864000.00	33301302.96	15927000.00	37791000	49228302.96	87534381.66	7.50436	72.4408	8.5161	0
JV_E	1	2000m6	3923071.00	10111188.98	29.62	116201363.02	16933000.00	27044188.98	25049000.00	41982000	52093188.98	89157174.04	6.89363	76.7264	10.7013	0
JV_E	1	2000m7	4457253.00	11487971.39	28.16	125516244.48	22481000.00	33968971.39	40122000.00	62603000	74090971.39	91547273.09	7.62106	72.9366	14.0452	0
JV_E	1	2000m8	4513241.00	11632272.95	29.41	132734417.81	24476000.00	36108272.95	50023000.00	74499000	86131272.95	96626144.86	8.00052	72.7966	16.5068	0
JV_E	1	2000m9	4261339.00	10983029.35	32.08	136703755.12	23962000.00	34945029.35	50023000.00	73985000	84968029.35	101758725.8	8.20048	74.4374	17.3619	0
JV_E	1	2000m10	4281714.00	11035543.18	31.4	134445819.60	24569000.00	35604543.18	50023000.00	74592000	85627543.18	98841276.42	8.31549	73.5176	17.4211	0
JV_E	1	2000m11	4645730.00	11973745.57	32.33	150196450.90	26447000.00	38420745.57	75000000.00	101447000	113420745.6	111775705.3	8.27012	74.4197	21.8366	0
JV_E	1	2000m12	2548639.00	6568774.97	25.28	64429593.92	21462000.00	28030774.97	75000000.00	96462000	103030775	36398818.95	10.9983	56.4939	37.8484	0
JV_E	1	2001m1	4745726.00	14383188.49	25.95	123151589.70	22106000.00	36489188.49	20093000.00	42199000	56582188.49	86662401.21	7.68885	70.3705	8.892	0

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JV_E	1	2001m2	4302557.00	13040046.62	27.24	117201652.68	20751000.00	33791046.62	20093000.00	40844000	53884046.62	83410606.06	7.85371	71.1685	9.49296	0
JV_E	1	2001m3	4994375.00	15136785.60	25.02	124959262.50	20097000.00	35233785.60	20093000.00	40190000	55326785.6	89725476.9	7.05469	71.8038	8.04705	0
JV_E	1	2001m4	4588186.00	13905721.50	25.66	117732852.76	20629000.00	34534721.50	20093000.00	40722000	54627721.5	83198131.26	7.52688	70.6669	8.8754	0
JV_E	1	2001m5	4625886.00	14019981.40	27.55	127443159.30	23918000.00	37937981.40	25034000.00	48952000	62971981.4	89505177.9	8.20124	70.2314	10.5822	0
JV_E	1	2001m6	4600644.00	13943478.79	26.97	124079368.68	20827000.00	34770478.79	25034000.00	45861000	59804478.79	89308889.89	7.55774	71.9772	9.96839	0
JV_E	1	2001m7	4500673.00	13640490.01	24.8	111616690.40	18289000.00	31929490.01	18762000.00	37051000	50691490.01	79687200.39	7.09438	71.3936	8.23232	0
JV_E	1	2001m8	4646866.00	14083566.89	25.81	119935611.46	20890000.00	34973566.89	18762000.00	39652000	53735566.89	84962044.57	7.52627	70.8397	8.53306	0
JV_E	1	2001m9	4613799.00	13983348.52	25.03	115483388.97	20805000.00	34788348.52	18762000.00	39567000	53550348.52	80695040.45	7.54007	69.8759	8.5758	0
JV_E	1	2001m10	4557701.00	13813328.57	20.73	94481141.73	17186000.00	30999328.57	18762000.00	35948000	49761328.57	63481813.16	6.80153	67.1899	7.88731	0
JV_E	1	2001m11	4446784.00	13477165.02	18.69	83110392.96	14765000.00	28242165.02	18762000.00	33527000	47004165.02	54868227.94	6.35114	66.0185	7.53961	0
JV_E	1	2001m12	4296691.00	13022268.15	18.52	79574717.32	14344000.00	27366268.15	18762000.00	33106000	46128268.15	52208449.17	6.36915	65.6093	7.705	0
JV_E	1	2002m1	4668754.00	17360372.79	19.15	89406639.10	14359000.00	31719372.79	5025000.00	19384000	36744372.79	57687266.31	6.79397	64.5224	4.15186	0
JV_E	1	2002m2	4275460.00	15897941.82	19.98	85423690.80	12873000.00	28770941.82	5025000.00	17898000	33795941.82	56652748.98	6.72932	66.3197	4.18622	0
JV_E	1	2002m3	4355141.00	16194228.98	23.64	102955533.24	16120000.00	32314228.98	5025000.00	21145000	37339228.98	70641304.26	7.41979	68.6134	4.85518	0
JV_E	1	2002m4	3758798.00	13976777.21	25.43	95586233.14	16320000.00	30296777.21	5025000.00	21345000	35321777.21	65289455.93	8.06023	68.3042	5.67868	0
JV_E	1	2002m5	3859143.00	14349901.74	25.69	99141383.67	16433000.00	30782901.74	5025000.00	21458000	35807901.74	68358481.93	7.97662	68.9505	5.5603	0
JV_E	1	2002m6	3762685.00	13991230.70	24.49	92148155.65	15428000.00	29419230.70	5025000.00	20453000	34444230.7	62728924.95	7.81868	68.074	5.43575	0
JV_E	1	2002m6	3829021.00	14237895.59	25.75	98597290.75	17782000.00	32019895.59	5025000.00	22807000	37044895.59	66577395.16	8.36242	67.5246	5.95635	0
JV_E	1	2002m8	4031976.00	14992566.85	26.78	107976317.28	19938000.00	34930566.85	5025000.00	24963000	39955566.85	73045750.43	8.66339	67.6498	6.19126	0
JV_E	1	2002m9	4090174.00	15208971.26	28.28	115670120.72	21093000.00	36301971.26	5025000.00	26118000	41326971.26	79368149.46	8.87541	68.6159	6.38555	0
JV_E	1	2002m10	4070308.00	15135101.20	27.53	112055579.24	19951000.00	35086101.20	5025000.00	24976000	40111101.2	76969478.04	8.62001	68.6887	6.13614	0
JV_E	1	2002m11	4048364.00	15053504.26	24.79	100358943.56	17790000.00	32843504.26	5025000.00	22815000	37868504.26	67515439.3	8.11278	67.274	5.63561	0

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JV_E	1	2002m12	3689333.00	13718477.40	27.89	102895497.37	21897000.00	35615477.40	5025000.00	26922000	40640477.4	67280019.97	9.65364	65.3867	7.29725	0
JV_E	1	2003m1	4055402.00	6535904.15	30.77	124784719.54	25499000.00	32034904.15	13454000.00	38953000	45488904.15	92749815.39	7.89932	74.3279	9.60521	1
JV_E	1	2003m2	3767820.00	6072421.52	32.88	123885921.60	24096000.00	30168421.52	13454000.00	37550000	43622421.52	93717500.08	8.00686	75.6482	9.96598	1
JV_E	1	2003m3	3494690.00	5632230.51	30.36	106098788.40	22662000.00	28294230.51	13454000.00	36116000	41748230.51	77804557.89	8.09635	73.3322	10.3345	1
JV_E	1	2003m4	3586266.00	5779819.32	25.49	91413920.34	16666000.00	22445819.32	13454000.00	30120000	35899819.32	68968101.02	6.25883	75.446	8.39871	1
JV_E	1	2003m5	3667942.00	5911452.75	26.06	95586568.52	22353000.00	28264452.75	13454000.00	35807000	41718452.75	67322115.77	7.70581	70.4305	9.76215	1
JV_E	1	2003m6	3511449.00	5659240.21	27.91	98004541.59	20606000.00	26265240.21	13454000.00	34060000	39719240.21	71739301.38	7.47989	73.2	9.6997	1
JV_E	1	2003m7	3802000.00	6127507.84	28.59	108699180.00	23449000.00	29576507.84	13454000.00	36903000	43030507.84	79122672.16	7.7792	72.7905	9.70621	1
JV_E	1	2003m8	4534281.00	7307691.32	29.68	134577460.08	28937000.00	36244691.32	35075000.00	64012000	71319691.32	98332768.76	7.99348	73.0678	14.1173	1
JV_E	1	2003m9	4715190.00	7599254.00	26.88	126744307.20	25872000.00	33471254.00	35075000.00	60947000	68546254	93273053.2	7.0986	73.5915	12.9257	1
JV_E	1	2003m10	4699565.00	7574071.91	29.01	136334380.65	27962000.00	35536071.91	35075000.00	63037000	70611071.91	100798308.7	7.56157	73.9346	13.4134	1
JV_E	1	2003m11	4919919.00	7929206.28	29.12	143268041.28	30863000.00	38792206.28	70150000.00	101013000	108942206.3	104475835	7.88472	72.9233	20.5314	1
JV_E	1	2003m12	9427958.00	15194604.57	29.95	282367342.10	37309000.00	52503604.57	70150000.00	107459000	122653604.6	229863737.5	5.56893	81.4059	11.3979	1
JV_E	1	2004m1	5800015.00	16626961.51	31.4	182120471.00	37969000.00	54595961.51	15380000.00	53349000	69975961.51	127524509.5	9.41307	70.0221	9.19808	1
JV_E	1	2004m2	5257980.00	15073104.31	31.32	164679933.60	35392000.00	50465104.31	15380000.00	50772000	65845104.31	114214829.3	9.59781	69.3556	9.65618	1
JV_E	1	2004m3	6454596.00	18503455.47	33.67	217326247.32	44954000.00	63457455.47	15380000.00	60334000	78837455.47	153868791.9	9.83136	70.8008	9.34745	1
JV_E	1	2004m4	5995389.00	17187042.13	33.71	202104563.19	41727000.00	58914042.13	72275000.00	114002000	131189042.1	143190521.1	9.82656	70.8497	19.0149	1
JV_E	1	2004m5	6305217.00	18075229.18	37.63	237265315.71	40929000.00	59004229.18	72275000.00	113204000	131279229.2	178261086.5	9.358	75.1315	17.954	1
JV_E	1	2004m6	6623941.00	18988918.49	35.54	235414863.14	55147000.00	74135918.49	72275000.00	127422000	146410918.5	161278944.7	11.1921	68.5084	19.2366	1
JV_E	1	2004m7	5846739.00	16760905.67	37.93	221766810.27	49577000.00	66337905.67	72275000.00	121852000	138612905.7	155428904.6	11.3461	70.0866	20.841	1
JV_E	1	2004m8	7297964.00	20921147.02	42.08	307098325.12	61502000.00	82423147.02	150259000.00	211761000	232682147	224675178.1	11.294	73.1607	29.0164	1
JV_E	1	2004m9	6708200.00	19230464.61	41.65	279396530.00	58464000.00	77694464.61	150259000.00	208723000	227953464.6	201702065.4	11.582	72.192	31.1146	1

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JV_E	1	2004m10	6431625.00	18437604.27	46.87	301450263.75	64276000.00	82713604.27	150259000.00	214535000	232972604.3	218736659.5	12.8605	72.5614	33.3563	1
JV_E	1	2004m11	6695679.00	19194570.53	42.23	282758524.17	50678000.00	69872570.53	297833000.00	348511000	367705570.5	212885953.6	10.4355	75.289	52.0501	1
JV_E	1	2004m12	6643064.00	19043738.58	39.09	259677371.76	49918000.00	68961738.58	290187000.00	340105000	359148738.6	190715633.2	10.381	73.4433	51.197	1
JV_E	1	2005m1	11884969.00	45986101.22	43.822	520823111.52	233000.00	46219101.22	178010000.00	178243000	224229101.2	474604010.3	3.88887	91.1258	14.9973	1
JV_E	1	2005m2	8854892.00	34261928.64	46.9836	416034703.77	233000.00	34494928.64	178010000.00	178243000	212504928.6	381539775.1	3.89558	91.7086	20.1293	1
JV_E	1	2005m3	9516227.00	36820809.38	53.2387	506631554.38	233000.00	37053809.38	178010000.00	178243000	215063809.4	469577745	3.89375	92.6862	18.7304	1
JV_E	1	2005m4	7673626.00	29691296.79	52.1535	400206453.59	233000.00	29924296.79	178010000.00	178243000	207934296.8	370282156.8	3.89963	92.5228	23.228	1
JV_E	1	2005m5	8531702.00	33011420.71	48.7608	416012614.88	233000.00	33244420.71	178010000.00	178243000	211254420.7	382768194.2	3.89658	92.0088	20.8918	1
JV_E	1	2005m6	8870645.00	34322881.18	54.3858	482437124.84	233000.00	34555881.18	178010000.00	178243000	212565881.2	447881243.7	3.89553	92.8372	20.0936	1
JV_E	1	2005m7	9468303.00	36635378.70	58.7619	556375474.06	233000.00	36868378.70	178010000.00	178243000	214878378.7	519507095.4	3.89387	93.3735	18.8252	1
JV_E	1	2005m8	6020104.00	23293381.07	65.3707	393538412.55	233000.00	23526381.07	178010000.00	178243000	201536381.1	370012031.5	3.90797	94.0218	29.608	1
JV_E	1	2005m9	7994206.00	30931705.95	63.8832	510695460.74	233000.00	31164705.95	178010000.00	178243000	209174705.9	479530754.8	3.89841	93.8976	22.2965	1
JV_E	1	2005m10	10053068.00	38897989.77	60.87		233000.00	39130989.77	178010000.00	178243000	217140989.8		3.89244		17.7302	1
JV_E	1	2005m11	9670075.00	37416088.15	55.1381	533189562.36	233000.00	37649088.15	178010000.00	178243000	215659088.1	495540474.2	3.89336	92.9389	18.4324	1
JV_E	1	2005m12	8603677.00	33289911.09	58.3034	501623621.60	233000.00	33522911.09	178010000.00	178243000	211532911.1	468100710.5	3.89635	93.3171	20.7171	1
JV_E	1	2006m1	9909094.00	42275403.45	63.4921	629149187.16	64890.00	42340293.45	209363.00	274253	42549656.45	586808893.7	4.27287	93.2702	0.02768	1
JV_E	1	2006m2	9655622.00	41194009.83	60.2523	581773433.43	71586.00	41265595.83	203536.00	275122	41469131.83	540507837.6	4.27374	92.9069	0.02849	1
JV_E	1	2006m3	8932883.00	38110571.24	62.1603	555270687.14	66989.00	38177560.24	137859.00	204848	38315419.24	517093126.9	4.27382	93.1245	0.02293	1
JV_E	1	2006m4	2019664.00	8616540.57		0.00	65173.00	8681713.57	137859.00	203032	8819572.568	-8681713.568	4.29859		0.10053	1
JV_E	1	2006m5	8954347.00	38202143.62	70.0808	627527801.24	66173.00	38268316.62	137859.00	204032	38406175.62	589259484.6	4.27371	93.9017	0.02279	1
JV_E	1	2006m6	3074955.00	13118753.66		0.00	58361.00	13177114.66	137859.00	196220	13314973.66	-13177114.66	4.2853		0.06381	1
JV_E	1	2006m7	8792576.00	37511976.15	74.2877	653180248.12	187806.00	37699782.15	166179.00	353985	37865961.15	615480466	4.28768	94.2283	0.04026	1

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JV_E	1	2006m8	1997624.00	8522510.79	69.6639	139162278.57	63751.00	8586261.79	148263.00	212014	8734524.792	130576016.8	4.29824	93.83	0.10613	1
JV_E	1	2006m9	8332487.00	35549087.51	63.1611	526289044.66	50066.00	35599153.51	148263.00	198329	35747416.51	490689891.2	4.27233	93.2358	0.0238	1
JV_E	1	2006m10	8247605.00	35186953.41	58.4447	482028799.94	44545.00	35231498.41	89639.00	134184	35321137.41	446797301.5	4.27172	92.691	0.01627	1
JV_E	1	2006m11	8364129.00	35684082.52	60.4533	505639199.68	50066.00	35734148.52	89639.00	139705	35823787.52	469905051.2	4.27231	92.9329	0.0167	1
JV_E	1	2006m12	10058802.00	42914106.26	59.084	594314257.37	44545.00	42958651.26	89639.00	134184	43048290.26	551355606.1	4.27075	92.7717	0.01334	1
JV_E	1	2007m1	6145836.00	20710827.17	54.5782	335428666.38	88269.00	20799096.17	125000.00	213269	20924096.17	314629570.2	3.38426	93.7992	0.0347	1
JV_E	1	2007m2	5826043.00	19633158.07	58.5746	341258138.31	55057.00	19688215.07	125000.00	180057	19813215.07	321569923.2	3.37935	94.2307	0.03091	1
JV_E	1	2007m3	6339223.00	21362521.22	64.3595	407989222.67	45636.00	21408157.22	72556.00	118192	21480713.22	386581065.4	3.37709	94.7528	0.01864	1
JV_E	1	2007m4	6532532.00	22013952.42	68.6	448131695.20	56730.00	22070682.42	82179.00	138909	22152861.42	426061012.8	3.37858	95.075	0.02126	1
JV_E	1	2007m5	6301710.00	21236106.32	68.88	434061784.80	82672.00	21318778.32	76984.00	159656	21395762.32	412743006.5	3.38301	95.0885	0.02534	1
JV_E	1	2007m6	6301710.00	21236106.32	68.88	434061784.80	58663.00	21294769.32	72566.00	131229	21367335.32	412767015.5	3.3792	95.0941	0.02082	1
JV_E	1	2007m7	6301710.00	21236106.32	68.88	434061784.80	64545.00	21300651.32	118874.00	183419	21419525.32	412761133.5	3.38014	95.0927	0.02911	1
JV_E	1	2007m8	6301710.00	21236106.32	68.88	434061784.80	60840.00	21296946.32	118874.00	179714	21415820.32	412764838.5	3.37955	95.0936	0.02852	1
JV_E	1	2007m9	6301710.00	21236106.32	68.88	434061784.80	69822.00	21305928.32	118874.00	188696	21424802.32	412755856.5	3.38098	95.0915	0.02994	1
JV_E	1	2007m10	6301710.00	21236106.32	68.88	434061784.80	67414.00	21303520.32	202383.00	269797	21505903.32	412758264.5	3.38059	95.0921	0.04281	1
JV_E	1	2007m11	3160000.00	10648870.86	68.88	217660800.00	71282.00	10720152.86	202383.00	273665	10922535.86	206940647.1	3.39245	95.0748	0.0866	1
JV_E	1	200m712	0.00	0.00	68.88	0.00	80667.00	80667.00	202383.00	283050	283050	-80667				1
JV_N	1	1999m1	4089307.00	8177262.45	11.32	46290955.24	3811000.00	11988262.45	0.00	3811000	11988262.45	34302692.79	2.93161	74.1024	0.93194	0
JV_N	1	1999m2	3838843.00	7676417.23	10.75	41267562.25	2577000.00	10253417.23	0.00	2577000	10253417.23	31014145.02	2.67097	75.1538	0.6713	0
JV_N	1	1999m3	4328682.00	8655933.33	12.86	55666850.52	2875000.00	11530933.33	1046000.00	3921000	12576933.33	44135917.19	2.66384	79.2858	0.90582	0
JV_N	1	1999m4	3972929.00	7944544.91	15.73	62494173.17	5471000.00	13415544.91	1046000.00	6517000	14461544.91	49078628.26	3.37674	78.5331	1.64035	0
JV_N	1	1999m5	4125510.00	8249656.48	16.12	66503221.20	5534000.00	13783656.48	1046000.00	6580000	14829656.48	52719564.72	3.34108	79.2737	1.59495	0

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JV_N	1	1999m6	3501986.00	7002814.56	16.24	56872252.64	5763000.00	12765814.56	2108000.00	7871000	14873814.56	44106438.08	3.64531	77.5535	2.24758	0
JV_N	1	1999m7	4055473.00	8109605.63	18.75	76040118.75	3863000.00	11972605.63	2108000.00	5971000	14080605.63	64067513.12	2.95221	84.2549	1.47233	0
JV_N	1	1999m8	3592892.00	7184596.52	20.21	72612347.32	5974000.00	13158596.52	2103000.00	8077000	15261596.52	59453750.8	3.6624	81.8783	2.24805	0
JV_N	1	1999m9	3554987.00	7108799.04	22.37	79525059.19	6758000.00	13866799.04	5560000.00	12318000	19426799.04	65658260.15	3.90066	82.563	3.46499	0
JV_N	1	1999m10	3630615.00	7260030.05	22.19	80563346.85	7049000.00	14309030.05	5560000.00	12609000	19869030.05	66254316.8	3.94121	82.2388	3.47297	0
JV_N	1	1999m11	3225835.00	6450603.83	24.22	78129723.70	3162000.00	9612603.83	5560000.00	8722000	15172603.83	68517119.87	2.97988	87.6966	2.7038	0
JV_N	1	1999m12	4392834.00	8784216.13	25.01	109864778.34	8335000.00	17119216.13	5560000.00	13895000	22679216.13	92745562.21	3.89708	84.4179	3.16311	0
JV_N	1	2000m1	4801851.00	6500011.48	25.21	121054663.71	9589000.00	16089011.48	8591000.00	18180000	24680011.48	104965652.2	3.35059	86.7093	3.78604	0
JV_N	1	2000m2	4491359.00	6079714.90	27.15	121940396.85	9762000.00	15841714.90	8591000.00	18353000	24432714.9	106098682	3.52715	87.0086	4.08629	0
JV_N	1	2000m3	4651845.00	6296956.30	27.49	127879219.05	6094000.00	12390956.30	9532000.00	15626000	21922956.3	115488262.8	2.66366	90.3104	3.3591	0
JV_N	1	2000m4	4523511.00	6123237.36	23.45	106076332.95	7575000.00	13698237.36	9532000.00	17107000	23230237.36	92378095.59	3.02823	87.0864	3.7818	0
JV_N	1	2000m5	3580891.00	4847262.57	27.23	97507661.93	16593000.00	21440262.57	11536000.00	28129000	32976262.57	76067399.36	5.98741	78.0117	7.85531	0
JV_N	1	2000m6	4558735.00	6170918.22	29.62	135029730.70	5646000.00	11816918.22	11536000.00	17182000	23352918.22	123212812.5	2.59215	91.2487	3.76903	0
JV_N	1	2000m7	5050974.00	6837236.09	28.16	142235427.84	10115000.00	16952236.09	11536000.00	21651000	28488236.09	125283191.7	3.35623	88.0816	4.2865	0
JV_N	1	2000m8	5465693.00	7398619.25	29.41	160746031.13	10318000.00	17716619.25	11536000.00	21854000	29252619.25	143029411.9	3.24142	88.9785	3.9984	0
JV_N	1	2000m9	5299774.00	7174023.48	32.08	170016749.92	8038000.00	15212023.48	11536000.00	19574000	26748023.48	154804726.4	2.87032	91.0526	3.69337	0
JV_N	1	2000m10	5380621.00	7283461.78	31.4	168951499.40	8951000.00	16234461.78	26327000.00	35278000	42561461.78	152717037.6	3.01721	90.3911	6.55649	0
JV_N	1	2000m11	5393549.00	7300961.73	32.33	174373439.17	18682000.00	25982961.73	33678000.00	52360000	59660961.73	148390477.4	4.81741	85.0992	9.70789	0
JV_N	1	2000m12	5948864.00	8052662.25	25.28	150387281.92	12488000.00	20540662.25	39534000.00	52022000	60074662.25	129846619.7	3.45287	86.3415	8.74486	0
JV_N	1	2001m1	5839474.00	9016371.27	25.95	151534350.30	15882000.00	24898371.27	53071000.00	68953000	77969371.27	126635979	4.2638	83.5692	11.8081	0
JV_N	1	2001m2	4863934.00	7510100.19	27.24	132493562.16	18929000.00	26439100.19	66852000.00	85781000	93291100.19	106054462	5.43574	80.045	17.6361	0
JV_N	1	2001m3	5878264.00	9076264.52	25.02	147074165.28	4722000.00	13798264.52	15005000.00	19727000	28803264.52	133275900.8	2.34734	90.6182	3.35592	0

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JV_N	1	2001m4	5898459.00	9107446.37	25.66	151354457.94	13099000.00	22206446.37	15005000.00	28104000	37211446.37	129148011.6	3.76479	85.3282	4.76463	0
JV_N	1	2001m5	6049773.00	9341080.97	27.55	166671246.15	10734000.00	20075080.97	15005000.00	25739000	35080080.97	146596165.2	3.31832	87.9553	4.25454	0
JV_N	1	2001m6	5612897.00	8666527.72	26.97	151379832.09	10874000.00	19540527.72	15005000.00	25879000	34545527.72	131839304.4	3.48136	87.0917	4.61063	0
JV_N	1	2001m7	5742972.00	8867368.49	24.8	142425705.60	14295000.00	23162368.49	15005000.00	29300000	38167368.49	119263337.1	4.03317	83.7372	5.10189	0
JV_N	1	2001m8	5760696.00	8894735.03	25.81	148683563.76	13920000.00	22814735.03	20040000.00	33960000	42854735.03	125868828.7	3.96041	84.6555	5.89512	0
JV_N	1	2001m9	5398162.00	8334968.66	25.03	135115994.86	9307000.00	17641968.66	20040000.00	29347000	37681968.66	117474026.2	3.26814	86.9431	5.43648	0
JV_N	1	2001m10	5234042.00	8081561.10	20.73	108501690.66	8902000.00	16983561.10	20040000.00	28942000	37023561.1	91518129.56	3.24483	84.3472	5.52957	0
JV_N	1	2001m11	5507070.00	8503126.78	18.69	102927138.30	12820000.00	21323126.78	20040000.00	32860000	41363126.78	81604011.52	3.87195	79.2833	5.96688	0
JV_N	1	2001m12	5785733.00	8933393.11	18.52	107151775.16	7758000.00	16691393.11	20040000.00	27798000	36731393.11	90460382.05	2.88492	84.4227	4.80458	0
JV_N	1	2002m1	5799122.00	10724131.42	19.15	111053186.30	8200000.00	18924131.42	26596000.00	34796000	45520131.42	92129054.88	3.26328	82.9594	6.00022	0
JV_N	1	2002m2	4263359.00	7884093.87	19.98	85181912.82	12930000.00	20814093.87	26596000.00	39526000	47410093.87	64367818.95	4.88209	75.5651	9.27109	0
JV_N	1	2002m3	5202395.00	9620623.20	23.64	122984617.80	4253000.00	13873623.20	16121000.00	20374000	29994623.2	109110994.6	2.66678	88.7192	3.91627	0
JV_N	1	2002m4	4701087.00	8693570.30	25.43	119548642.41	9649000.00	18342570.30	16121000.00	25770000	34463570.3	101206072.1	3.90177	84.6568	5.48171	0
JV_N	1	2002m5	4495065.00	8312580.38	25.69	115478219.85	13102000.00	21414580.38	16121000.00	29223000	37535580.38	94063639.47	4.76402	81.4557	6.50113	0
JV_N	1	2002m6	4035819.00	7463311.40	24.49	98837207.31	8480000.00	15943311.40	16121000.00	24601000	32064311.4	82893895.91	3.95045	83.8691	6.09566	0
JV_N	1	2002m6	4865591.00	8997782.30	25.75	125288968.25	9270000.00	18267782.30	12156000.00	21426000	30423782.3	107021185.9	3.75448	85.4195	4.40358	0
JV_N	1	2002m8	4688779.00	8670809.51	26.78	125565501.62	8778000.00	17448809.51	12156000.00	20934000	29604809.51	108116692.1	3.7214	86.1038	4.4647	0
JV_N	1	2002m9	5086094.00	9405551.47	28.28	143834738.32	8742000.00	18147551.47	12156000.00	20898000	30303551.47	125687186.8	3.56807	87.3831	4.10885	0
JV_N	1	2002m10	5295010.00	9791893.17	27.53	145771625.30	9048000.00	18839893.17	12156000.00	21204000	30995893.17	126931732.1	3.55805	87.0757	4.00453	0
JV_N	1	2002m11	5681650.00	10506894.19	24.79	140848103.50	13538000.00	24044894.19	12156000.00	25694000	36200894.19	116803209.3	4.23203	82.9285	4.52228	0
JV_N	1	2002m12	5276656.00	9757951.70	27.89	147165935.84	11241000.00	20998951.70	12156000.00	23397000	33154951.7	126166984.1	3.97959	85.7311	4.43406	0
JV_N	1	2003m1	5605228.00	9811148.82	30.77	172472865.56	9686000.00	19497148.82	12156000.00	21842000	31653148.82	152975716.7	3.47839	88.6955	3.89672	1

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
JV_N	1	2003m2	4913321.00	8600064.72	32.88	161549994.48	11239000.00	19839064.72	12156000.00	23395000	31995064.72	141710929.8	4.03781	87.7196	4.76155	1
JV_N	1	2003m3	5766525.00	10093476.12	30.36	175071699.00	7817000.00	17910476.12	12899000.00	20716000	30809476.12	157161222.9	3.10594	89.7696	3.59246	1
JV_N	1	2003m4	5607678.00	9815437.20	25.49	142939712.22	15464000.00	25279437.20	12899000.00	28363000	38178437.2	117660275	4.508	82.3146	5.05789	1
JV_N	1	2003m5	5946001.00	10407623.15	26.06	154952786.06	18201000.00	28608623.15	12899000.00	31100000	41507623.15	126344162.9	4.81141	81.5372	5.23041	1
JV_N	1	2003m6	5767667.00	10095475.03	27.91	160975585.97	14364000.00	24459475.03	12899000.00	27263000	37358475.03	136516110.9	4.24079	84.8055	4.72687	1
JV_N	1	2003m7	5484479.00	9599794.99	28.59	156801254.61	10801000.00	20400794.99	12899000.00	23700000	33299794.99	136400459.6	3.71973	86.9894	4.32129	1
JV_N	1	2003m8	6006760.00	10513973.08	29.68	178280636.80	12079000.00	22592973.08	12899000.00	24978000	35491973.08	155687663.7	3.76126	87.3273	4.15831	1
JV_N	1	2003m9	4831898.00	8457545.42	26.88	129881418.24	17915000.00	26372545.42	25647000.00	43562000	52019545.42	103508872.8	5.45801	79.6949	9.0155	1
JV_N	1	2003m10	5878547.00	10289554.59	29.01	170536648.47	15674000.00	25963554.59	30245000.00	45919000	56208554.59	144573093.9	4.41666	84.7754	7.81128	1
JV_N	1	2003m11	5616606.00	9831064.38	29.12	163555566.72	15706000.00	25537064.38	35104000.00	50810000	60641064.38	138018502.3	4.54671	84.3863	9.04639	1
JV_N	1	2003m12	6104056.00	10684275.79	29.95	182816477.20	6429000.00	17113275.79	42027000.00	48456000	59140275.79	165703201.4	2.80359	90.6391	7.93833	1
JV_N	1	2004m1	5806730.00	12347938.65	31.4	182331322.00	23511000.00	35858938.65	49743000.00	73254000	85601938.65	146472383.4	6.17541	80.3331	12.6154	1
JV_N	1	2004m2	5200487.00	11058770.50	31.32	162879252.84	18223000.00	29281770.50	79381000.00	97604000	108662770.5	133597482.3	5.63058	82.0224	18.7682	1
JV_N	1	2004m3	5634221.00	11981100.42	33.67	189704221.07	6497000.00	18478100.42	20149000.00	26646000	38627100.42	171226120.6	3.27962	90.2595	4.72931	1
JV_N	1	2004m4	5480907.00	11655080.12	33.71	184761374.97	21452000.00	33107080.12	21008000.00	42460000	54115080.12	151654294.9	6.04044	82.0812	7.74689	1
JV_N	1	2004m5	5594562.00	11896766.05	37.63	210523368.06	24851000.00	36747766.05	29232000.00	54083000	65979766.05	173775602	6.56848	82.5446	9.66707	1
JV_N	1	2004m6	5425738.00	11537763.93	35.54	192830728.52	15643000.00	27180763.93	30812000.00	46455000	57992763.93	165649964.6	5.0096	85.9043	8.56197	1
JV_N	1	2004m7	5621564.00	11954185.47	37.93	213225922.52	18433000.00	30387185.47	35731000.00	54164000	66118185.47	182838737.1	5.40547	85.7488	9.63504	1
JV_N	1	2004m8	5481935.00	11657266.15	42.08	230679824.80	22958000.00	34615266.15	38991000.00	61949000	73606266.15	196064558.7	6.31442	84.9942	11.3006	1
JV_N	1	2004m9	5356586.00	11390713.07	41.65	223101806.90	20285000.00	31675713.07	43355000.00	63640000	75030713.07	191426093.8	5.91341	85.8021	11.8807	1
JV_N	1	2004m10	5534951.00	11770004.01	46.87	259423153.37	11237000.00	23007004.01	47515000.00	58752000	70522004.01	236416149.4	4.15668	91.1315	10.6147	1
JV_N	1	2004m11	5399332.00	11481611.90	42.23	228013790.36	39549000.00	51030611.90	53604000.00	93153000	104634611.9	176983178.5	9.45128	77.6195	17.2527	1

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JV_N	1	2004m12	5724656.00	12173409.32	39.09	223776803.04	18367000.00	30540409.32	64050000.00	82417000	94590409.32	193236393.7	5.33489	86.3523	14.3968	1
JV_N	1	2005m1	5252198.00	11553321.46	43.822	230161820.76	13649000.00	25202321.46	39492000.00	53141000	64694321.46	204959499.3	4.79843	89.0502	10.1179	1
JV_N	1	2005m2	4637079.00	10200236.99	46.9836	217866664.90	13649000.00	23849236.99	39492000.00	53141000	63341236.99	194017427.9	5.14316	89.0533	11.46	1
JV_N	1	2005m3	5313488.00	11688141.80	53.2387	282883193.59	13649000.00	25337141.80	39492000.00	53141000	64829141.8	257546051.8	4.76846	91.0432	10.0012	1
JV_N	1	2005m4	5212974.00	11467039.97	52.1535	271874839.51	13649000.00	25116039.97	39492000.00	53141000	64608039.97	246758799.5	4.81799	90.7619	10.194	1
JV_N	1	2005m5	5310483.00	11681531.66	48.7608	258943399.47	13649000.00	25330531.66	39492000.00	53141000	64822531.66	233612867.8	4.76991	90.2177	10.0068	1
JV_N	1	2005m6	5488834.00	12073852.45	54.3858	298514628.16	13649000.00	25722852.45	39492000.00	53141000	65214852.45	272791775.7	4.6864	91.3831	9.68166	1
JV_N	1	2005m7	5111694.00	11244253.17	58.7619	300372851.66	13649000.00	24893253.17	39492000.00	53141000	64385253.17	275479598.5	4.86986	91.7125	10.396	1
JV_N	1	2005m8	5201961.00	11442814.55	65.3707	340055831.94	13649000.00	25091814.55	39492000.00	53141000	64583814.55	314964017.4	4.82353	92.6213	10.2156	1
JV_N	1	2005m9	5135737.00	11297140.84	63.8832	328087313.92	13649000.00	24946140.84	39492000.00	53141000	64438140.84	303141173.1	4.85736	92.3965	10.3473	1
JV_N	1	2005m10	5268998.00	11590276.62	60.87		13649000.00	25239276.62	39492000.00	53141000	64731276.62		4.79015		10.0856	1
JV_N	1	2005m11	4961657.00	10914215.02	55.1381	273576339.83	13649000.00	24563215.02	39492000.00	53141000	64055215.02	249013124.8	4.95061	91.0214	10.7103	1
JV_N	1	2005m12	5367932.00	11807902.90	58.3034	312968686.57	13649000.00	25456902.90	39492000.00	53141000	64948902.9	287511783.7	4.7424	91.866	9.89972	1
JV_N	1	2006m1	2643876.00	8873024.90	63.4921	167865239.38	32931000.00	41804024.90	122852000.00	155783000	164656024.9	126061214.5	15.8116	75.0967	58.9222	1
JV_N	1	2006m2	5149183.00	17281002.96	60.2523	310250118.87	35308000.00	52589002.96	106579000.00	141887000	159168003	257661115.9	10.2131	83.0495	27.5552	1
JV_N	1	2006m3	2108491.00	7076236.99	62.1603	131064433.11	29428000.00	36504236.99	63590000.00	93018000	100094237	94560196.12	17.313	72.1479	44.1159	1
JV_N	1	2006m4	0.00	0.00		0.00	16651000.00	16651000.00	64392000.00	81043000	81043000	-16651000				1
JV_N	1	2006m5	2441578.00	8194099.27	70.0808	171107739.50	23726000.00	31920099.27	75671000.00	99397000	107591099.3	139187640.2	13.0736	81.345	40.7101	1
JV_N	1	2006m6	0.00	0.00		0.00	28796000.00	28796000.00	51727000.00	80523000	80523000	-28796000				1
JV_N	1	2006m7	2225343.00	7468400.13	74.2877	165315613.18	15946000.00	23414400.13	53052000.00	68998000	76466400.13	141901213.1	10.5217	85.8365	31.0056	1
JV_N	1	2006m8	2489026.00	8353337.93	69.6639	173395258.36	29121000.00	37474337.93	62200000.00	91321000	99674337.93	135920920.4	15.0558	78.3879	36.6895	1
JV_N	1	2006m9	2260757.00	7587251.88	63.1611	142791898.95	26408000.00	33995251.88	104490000.00	130898000	138485251.9	108796647.1	15.0371	76.1925	57.9001	1

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JV_N	1	2006m10	831351.00	2790069.63	58.4447	48588059.79	16498000.00	19288069.63	14539000.00	31037000	33827069.63	29299990.16	23.2009	60.3029	37.3332	1
JV_N	1	2006m11	556730.00	1868423.16	60.4533	33656165.71	25913000.00	27781423.16	25266000.00	51179000	53047423.16	5874742.548	49.9011	17.4552	91.9279	1
JV_N	1	2006m12	1746150.00	5860196.33	59.084	103169526.60	19266000.00	25126196.33	18544000.00	37810000	43670196.33	78043330.27	14.3895	75.6457	21.6534	1
JV_N	1	2007m1	1602786.00	7495185.88	54.5782	87477174.87	16411000.00	23906185.88	30044000.00	46455000	53950185.88	63570988.99	14.9154	72.6715	28.9839	1
JV_N	1	2007m2	1430609.00	6690026.23	58.5746	83797349.93	6359000.00	13049026.23	30150000.00	36509000	43199026.23	70748323.7	9.12131	84.4279	25.5199	1
JV_N	1	2007m3	1706183.00	7978706.28	64.3595	109809084.79	12007000.00	19985706.28	58820000.00	70827000	78805706.28	89823378.5	11.7137	81.7996	41.512	1
JV_N	1	2007m4	1460754.00	6830994.75	68.6	100207724.40	23062000.00	29892994.75	15627000.00	38689000	45519994.75	70314729.65	20.4641	70.169	26.4856	1
JV_N	1	2007m5	1559387.00	7292237.03	68.88	107410576.56	24745000.00	32037237.03	16251000.00	40996000	48288237.03	75373339.53	20.5448	70.1731	26.2898	1
JV_N	1	2007m6	1559387.00	7292237.03	68.88	107410576.56	17334000.00	24626237.03	30452000.00	47786000	55078237.03	82784339.53	15.7923	77.0728	30.6441	1
JV_N	1	2007m7	1559387.00	7292237.03	68.88	107410576.56	17091000.00	24383237.03	13870000.00	30961000	38253237.03	83027339.53	15.6364	77.299	19.8546	1
JV_N	1	2007m8	1559387.00	7292237.03	68.88	107410576.56	13174000.00	20466237.03	16695000.00	29869000	37161237.03	86944339.53	13.1245	80.9458	19.1543	1
JV_N	1	2007m9	1559387.00	7292237.03	68.88	107410576.56	21013000.00	28305237.03	18776000.00	39789000	47081237.03	79105339.53	18.1515	73.6476	25.5158	1
JV_N	1	2007m10	1559387.00	7292237.03	68.88	107410576.56	22439000.00	29731237.03	21274000.00	43713000	51005237.03	77679339.53	19.066	72.32	28.0322	1
JV_N	1	2007m11	1765000.00	8253755.07	68.88	121573200.00	29621000.00	37874755.07	26799000.00	56420000	64673755.07	83698444.93	21.4588	68.8461	31.966	1
JV_N	1	200m712	0.00	0.00	68.88	0.00		0.00	44838000.00	44838000	44838000	0				1
JV_M	1	1999m1	20474737.00	36459418.08	11.32	231774022.84	16502000.00	52961418.08	8838000.00	25340000	61799418.08	178812604.8	2.58667	77.1495	1.23762	0
JV_M	1	1999m2	15900400.00	28313884.14	10.75	170929300.00	11349000.00	39662884.14	8838000.00	20187000	48500884.14	131266415.9	2.49446	76.7957	1.26959	0
JV_M	1	1999m3	19150541.00	34101418.78	12.86	246275957.26	15973000.00	50074418.78	8651000.00	24624000	58725418.78	196201538.5	2.61478	79.6674	1.28581	0
JV_M	1	1999m4	18791513.00	33462096.68	15.73	295590499.49	23592000.00	57054096.68	14846000.00	38438000	71900096.68	238536402.8	3.03616	80.6983	2.0455	0
JV_M	1	1999m5	18374277.00	32719123.43	16.12	296193345.24	20526000.00	53245123.43	14846000.00	35372000	68091123.43	242948221.8	2.89781	82.0235	1.92508	0
JV_M	1	1999m6	18969722.00	33779433.91	16.24	308068285.28	20304000.00	54083433.91	14846000.00	35150000	68929433.91	253984851.4	2.85104	82.4443	1.85295	0
JV_M	1	1999m7	18673802.00	33252488.39	18.75	350133787.50	25444000.00	58696488.39	14846000.00	40290000	73542488.39	291437299.1	3.14325	83.236	2.15757	0

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
JV_M	1	1999m8	19846869.00	35341371.88	20.21	401105222.49	29480000.00	64821371.88	36283000.00	65763000	101104371.9	336283850.6	3.26608	83.8393	3.31352	0
JV_M	1	1999m9	19359331.00	34473211.68	22.37	433068234.47	31162000.00	65635211.68	36283000.00	67445000	101918211.7	367433022.8	3.39037	84.8441	3.48385	0
JV_M	1	1999m10	19188213.00	34168501.41	22.19	425786446.47	31090000.00	65258501.41	66219000.00	97309000	131477501.4	360527945.1	3.40097	84.6734	5.07129	0
JV_M	1	1999m11	17667653.00	31460836.21	24.22	427910555.66	31135000.00	62595836.21	66219000.00	97354000	128814836.2	365314719.4	3.54296	85.3717	5.5103	0
JV_M	1	1999m12	18166375.00	32348911.79	25.01	454341038.75	34375000.00	66723911.79	96928000.00	131303000	163651911.8	387617127	3.67293	85.3141	7.2278	0
JV_M	1	2000m1	18697706.00	28962106.71	25.21	471369168.26	33474000.00	62436106.71	96928000.00	130402000	159364106.7	408933061.5	3.33924	86.7543	6.97422	0
JV_M	1	2000m2	17335046.00	26851393.00	27.15	470646498.90	33934000.00	60785393.00	73275000.00	107209000	134060393	409861105.9	3.5065	87.0847	6.18452	0
JV_M	1	2000m3	18206324.00	28200972.81	27.49	500491846.76	39057000.00	67257972.81	67039000.00	106096000	134296972.8	433233874	3.69421	86.5616	5.82743	0
JV_M	1	2000m4	16478987.00	25525386.91	23.45	386432245.15	27914000.00	53439386.91	67039000.00	94953000	120478386.9	332992858.2	3.24288	86.1711	5.76207	0
JV_M	1	2000m5	15302010.00	23702289.82	27.23	416673732.30	30934000.00	54636289.82	67039000.00	97973000	121675289.8	362037442.5	3.57053	86.8875	6.40262	0
JV_M	1	2000m6	17114945.00	26510464.09	29.62	506944670.90	37766000.00	64276464.09	67039000.00	104805000	131315464.1	442668206.8	3.75558	87.3208	6.1236	0
JV_M	1	2000m7	18452088.00	28581652.83	28.16	519610798.08	38103000.00	66684652.83	67039000.00	105142000	133723652.8	452926145.2	3.61394	87.1664	5.69811	0
JV_M	1	2000m8	18398288.00	28498318.48	29.41	541093650.08	39287000.00	67785318.48	93787000.00	133074000	161572318.5	473308331.6	3.68433	87.4725	7.23296	0
JV_M	1	2000m9	17773674.00	27530812.76	32.08	570179461.92	41609000.00	69139812.76	93787000.00	135396000	162926812.8	501039649.2	3.89001	87.874	7.61778	0
JV_M	1	2000m10	18299515.00	28345322.48	31.4	574604771.00	41585000.00	69930322.48	93787000.00	135372000	163717322.5	504674448.5	3.82143	87.8298	7.39757	0
JV_M	1	2000m11	17738052.00	27475635.51	32.33	573471221.16	41916000.00	69391635.51	117840000.00	159756000	187231635.5	504079585.7	3.91202	87.8997	9.0064	0
JV_M	1	2000m12	17291357.00	26783720.24	25.28	437125504.96	34240000.00	61023720.24	117840000.00	152080000	178863720.2	376101784.7	3.52915	86.0398	8.79515	0
JV_M	1	2001m1	18598681.00	29558529.06	25.95	482635771.95	35249000.00	64807529.06	117840000.00	153089000	182647529.1	417828242.9	3.48452	86.5722	8.23118	0
JV_M	1	2001m2	16523839.00	26261022.23	27.24	450109374.36	35708000.00	61969022.23	134310000.00	170018000	196279022.2	388140352.1	3.75028	86.2325	10.2893	0
JV_M	1	2001m3	18523937.00	29439739.85	25.02	463468903.74	33450000.00	62889739.85	72808000.00	106258000	135697739.8	400579163.9	3.39505	86.4306	5.73625	0
JV_M	1	2001m4	17890014.00	28432258.11	25.66	459057759.24	32730000.00	61162258.11	72808000.00	105538000	133970258.1	397895501.1	3.41879	86.6766	5.89927	0
JV_M	1	2001m5	17836736.00	28347584.40	27.55	491402076.80	37303000.00	65650584.40	72808000.00	110111000	138458584.4	425751492.4	3.68064	86.6401	6.17327	0

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
JV_M	1	2001m6	16472664.00	26179690.78	26.97	444267748.08	33340000.00	59519690.78	72808000.00	106148000	132327690.8	384748057.3	3.61324	86.6027	6.44389	0
JV_M	1	2001m7	17353678.00	27579869.53	24.8	430371214.40	31391000.00	58970869.53	72808000.00	104199000	131778869.5	371400344.9	3.39818	86.2977	6.00443	0
JV_M	1	2001m8	17323230.00	27531479.11	25.81	447112566.30	32306000.00	59837479.11	72808000.00	105114000	132645479.1	387275087.2	3.45418	86.6169	6.06781	0
JV_M	1	2001m9	16938860.00	26920607.20	25.03	423979665.80	31556000.00	58476607.20	94638000.00	126194000	153114607.2	365503058.6	3.45222	86.2077	7.44997	0
JV_M	1	2001m10	16930924.00	26907994.66	20.73	350978054.52	25270000.00	52177994.66	94638000.00	119908000	146815994.7	298800059.9	3.08182	85.1335	7.08219	0
JV_M	1	2001m11	16068772.00	25537792.93	18.69	300325348.68	22182000.00	47719792.93	68955000.00	91137000	116674792.9	252605555.8	2.96972	84.1106	5.67168	0
JV_M	1	2001m12	16971689.00	26972781.70	18.52	314315680.28	23028000.00	50000781.70	68955000.00	91983000	118955781.7	264314898.6	2.94613	84.0922	5.41979	0
JV_M	1	2002m1	15932154.00	3974749.14	19.15	305100749.10	22551000.00	26525749.14	68955000.00	91506000	95480749.14	278575000	1.66492	91.3059	5.74348	0
JV_M	1	2002m2	13844923.00	3454027.36	19.98	276621561.54	20162000.00	23616027.36	68955000.00	89117000	92571027.36	253005534.2	1.70575	91.4627	6.4368	0
JV_M	1	2002m3	14398915.00	3592237.12	23.64	340390350.60	26999000.00	30591237.12	27186000.00	54185000	57777237.12	309799113.5	2.12455	91.0129	3.76313	0
JV_M	1	2002m4	14786869.00	3689023.77	25.43	376030078.67	27727000.00	31416023.77	27186000.00	54913000	58602023.77	344614054.9	2.12459	91.6453	3.71363	0
JV_M	1	2002m5	14410564.00	3595143.31	25.69	370207389.16	26309000.00	29904143.31	27186000.00	53495000	57090143.31	340303245.9	2.07515	91.9223	3.71221	0
JV_M	1	2002m6	13780325.00	3437911.47	24.49	337480159.25	24295000.00	27732911.47	27186000.00	51481000	54918911.47	309747247.8	2.0125	91.7824	3.73583	0
JV_M	1	2002m6	14195464.00	3541480.22	25.75	365533198.00	26693000.00	30234480.22	46657000.00	73350000	76891480.22	335298717.8	2.12987	91.7287	5.16714	0
JV_M	1	2002m8	15240898.00	3802294.79	26.78	408151248.44	29643000.00	33445294.79	46657000.00	76300000	80102294.79	374705953.6	2.19444	91.8057	5.00627	0
JV_M	1	2002m9	15025482.00	3748552.87	28.28	424920630.96	31130000.00	34878552.87	46657000.00	77787000	81535552.87	390042078.1	2.32129	91.7917	5.17701	0
JV_M	1	2002m10	14092963.00	3515908.30	27.53	387979271.39	28516000.00	32031908.30	46657000.00	75173000	78688908.3	355947363.1	2.2729	91.7439	5.33408	0
JV_M	1	2002m11	14805848.00	3693758.64	24.79	367036971.92	26391000.00	30084758.64	46657000.00	73048000	76741758.64	336952213.3	2.03195	91.8033	4.93373	0
JV_M	1	2002m12	13948323.00	3479823.56	27.89	389018728.47	30602000.00	34081823.56	46657000.00	77259000	80738823.56	354936904.9	2.44344	91.239	5.53895	0
JV_M	1	2003m1	16855211.00	41871166.41	30.77	518634842.47	42502000.00	84373166.41	156581000.00	199083000	240954166.4	434261676.1	5.00576	83.7317	11.8114	1
JV_M	1	2003m2	15835117.00	39337082.10	32.88	520658646.96	41335000.00	80672082.10	156581000.00	197916000	237253082.1	439986564.9	5.0945	84.5058	12.4985	1
JV_M	1	2003m3	18009538.00	44738707.96	30.36	546769573.68	42263000.00	87001707.96	58487000.00	100750000	145488708	459767865.7	4.83087	84.088	5.59426	1

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JV_M	1	2003m4	19336771.00	48035776.97	25.49	492894292.79	40099000.00	88134776.97	58487000.00	98586000	146621777	404759515.8	4.55788	82.1189	5.09837	1
JV_M	1	2003m5	16902209.00	41987917.31	26.06	440471566.54	36425000.00	78412917.31	58487000.00	94912000	136899917.3	362058649.2	4.63921	82.198	5.61536	1
JV_M	1	2003m6	15454826.00	38392375.58	27.91	431344193.66	38049000.00	76441375.58	58487000.00	96536000	134928375.6	354902818.1	4.94612	82.2783	6.24633	1
JV_M	1	2003m7	165113.00	410168.34	28.59	4720580.67	39715000.00	40125168.34	58487000.00	98202000	98612168.34	-35404587.67	243.016	-750	594.756	1
JV_M	1	2003m8	16363303.00	40649184.57	29.68	485662833.04	41599000.00	82248184.57	58487000.00	100086000	140735184.6	403414648.5	5.02638	83.0648	6.11649	1
JV_M	1	2003m9	15859822.00	39398453.46	26.88	426312015.36	36671000.00	76069453.46	58487000.00	95158000	134556453.5	350242561.9	4.79636	82.1564	5.99994	1
JV_M	1	2003m10	16254275.00	40378340.76	29.01	471536517.75	44293000.00	84671340.76	101681000.00	145974000	186352340.8	386865177	5.20917	82.0435	8.98065	1
JV_M	1	2003m11	16306917.00	40509112.30	29.12	474857423.04	39889000.00	80398112.30	101681000.00	141570000	182079112.3	394459310.7	4.93031	83.069	8.68159	1
JV_M	1	2003m12	16338228.00	40586894.07	29.95	489329928.60	40970000.00	81556894.07	138384000.00	179354000	219940894.1	407773034.5	4.99178	83.3329	10.9776	1
JV_M	1	2004m1	17032607.00	52519375.61	31.4	534823859.80	45357000.00	97876375.61	170958000.00	216315000	268834375.6	436947484.2	5.74641	81.6993	12.7001	1
JV_M	1	2004m2	15591608.00	48076111.72	31.32	488329162.56	41319000.00	89395111.72	165234000.00	206553000	254629111.7	398934050.8	5.73354	81.6937	13.2477	1
JV_M	1	2004m3	16941083.00	52237164.95	33.67	570406264.61	49230000.00	101467164.95	59001000.00	108231000	160468164.9	468939099.7	5.98941	82.2114	6.38867	1
JV_M	1	2004m4	16726901.00	51576743.15	33.71	563863832.71	46270000.00	97846743.15	59001000.00	105271000	156847743.2	466017089.6	5.84966	82.6471	6.29351	1
JV_M	1	2004m5	16197359.00	49943921.17	37.63	609506619.17	55559000.00	105502921.17	88515000.00	144074000	194017921.2	504003698	6.51359	82.6904	8.89491	1
JV_M	1	2004m6	16323493.00	50332850.41	35.54	580136941.22	52115000.00	102447850.41	94587000.00	146702000	197034850.4	477689090.8	6.2761	82.3407	8.98717	1
JV_M	1	2004m7	17004082.00	52431419.89	37.93	644964830.26	57440000.00	109871419.89	94587000.00	152027000	204458419.9	535093410.4	6.46147	82.9647	8.94062	1
JV_M	1	2004m8	16622287.00	51254169.99	42.08	699465836.96	63694000.00	114948169.99	94587000.00	158281000	209535170	584517667	6.9153	83.5663	9.52222	1
JV_M	1	2004m9	15755140.00	48580356.23	41.65	656201581.00	61379000.00	109959356.23	140446000.00	201825000	250405356.2	546242224.8	6.97927	83.2431	12.8101	1
JV_M	1	2004m10	16404564.00	50582829.66	46.87	768881914.68	73358000.00	123940829.66	162472000.00	235830000	286412829.7	644941085	7.55527	83.8804	14.3759	1
JV_M	1	2004m11	15291157.00	47149682.84	42.23	645745560.11	60067000.00	107216682.84	198026000.00	258093000	305242682.8	538528877.3	7.01168	83.3965	16.8786	1
JV_M	1	2004m12	16160135.00	49829142.42	39.09	631699677.15	56807000.00	106636142.42	198026000.00	254833000	304662142.4	525063534.7	6.59872	83.1192	15.7692	1
JV_M	1	2005m1	17677057.00	43524494.05	43.822	774643991.85	80381000.00	123905494.05	226469000.00	306850000	350374494.1	650738497.8	7.0094	84.0048	17.3587	1

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
JV_M	1	2005m2	16829807.00	41438392.98	46.9836	790724920.17	80381000.00	121819392.98	226469000.00	306850000	348288393	668905527.2	7.23831	84.594	18.2325	1
JV_M	1	2005m3	18838153.00	46383347.54	53.2387	1002918776.12	80381000.00	126764347.54	226469000.00	306850000	353233347.5	876154428.6	6.72913	87.3605	16.2888	1
JV_M	1	2005m4	17245725.00	42462467.32	52.1535	899424918.79	80381000.00	122843467.32	226469000.00	306850000	349312467.3	776581451.5	7.12313	86.342	17.7928	1
JV_M	1	2005m5	19053628.00	46913890.62	48.7608	929070144.18	80381000.00	127294890.62	226469000.00	306850000	353763890.6	801775253.6	6.68087	86.2987	16.1045	1
JV_M	1	2005m6	17327593.00	42664042.92	54.3858	942375007.38	80381000.00	123045042.92	226469000.00	306850000	349514042.9	819329964.5	7.1011	86.9431	17.7087	1
JV_M	1	2005m7	21417603.00	52734475.79	58.7619	1258539045.73	80381000.00	133115475.79	226469000.00	306850000	359584475.8	1125423570	6.21524	89.423	14.327	1
JV_M	1	2005m8	22819701.00	56186725.00	65.3707	1491739828.16	80381000.00	136567725.00	226469000.00	306850000	363036725	1355172103	5.98464	90.8451	13.4467	1
JV_M	1	2005m9	22196915.00	54653299.75	63.8832	1418009960.33	80381000.00	135034299.75	226469000.00	306850000	361503299.8	1282975661	6.08347	90.4772	13.824	1
JV_M	1	2005m10	23099925.00	56876693.24	60.87		80381000.00	137257693.24	226469000.00	306850000	363726693.2		5.94191		13.2836	1
JV_M	1	2005m11	23250039.00	57246304.30	55.1381	1281962975.39	80381000.00	137627304.30	226469000.00	306850000	364096304.3	1144335671	5.91944	89.2643	13.1978	1
JV_M	1	2005m12	22748762.00	56012058.82	58.3034	1326330170.39	80381000.00	136393058.82	226469000.00	306850000	362862058.8	1189937112	5.99563	89.7165	13.4886	1
JV_M	1	2006m1	23342211.00	44604764.14	63.4921	1482045995.03	101658.00	44706422.14	234658.00	336316	44941080.14	1437339573	1.91526	96.9835	0.01441	1
JV_M	1	2006m2	20411096.00	39003679.77	60.2523	1229815479.52	106267.00	39109946.77	234658.00	340925	39344604.77	1190705533	1.91611	96.8199	0.0167	1
JV_M	1	2006m3	24219064.00	46280347.54	62.1603	1505464283.96	114514.00	46394861.54	304849.00	419363	46699710.54	1459069422	1.91563	96.9182	0.01732	1
JV_M	1	2006m4	6536714.00	12491044.07		0.00	97192.00	12588236.07	304089.00	401281	12892325.07	-12588236.07	1.92577		0.06139	1
JV_M	1	2006m5	22614484.00	43214146.47	70.0808	1584841130.31	115690.00	43329836.47	304089.00	419779	43633925.47	1541511294	1.91602	97.266	0.01856	1
JV_M	1	2006m6	5700600.00	10893309.06		0.00	121921.00	11015230.06	363736.00	485657	11378966.06	-11015230.06	1.93229		0.08519	1
JV_M	1	2006m7	24506322.00	46829270.49	74.2877	1820518296.84	126283.00	46955553.49	363736.00	490019	47319289.49	1773562743	1.91606	97.4208	0.02	1
JV_M	1	2006m8	23181971.00	44298560.61	69.6639	1614946509.55	128764.00	44427324.61	363736.00	492500	44791060.61	1570519185	1.91646	97.249	0.02124	1
JV_M	1	2006m9	21861202.00	41774695.60	63.1611	1380777565.64	135846.00	41910541.60	363736.00	499582	42274277.6	1338867024	1.91712	96.9647	0.02285	1
JV_M	1	2006m10	23498450.00	44903322.14	58.4447	1373359860.72	130548.00	45033870.14	363736.00	494284	45397606.14	1328325991	1.91646	96.7209	0.02103	1
JV_M	1	2006m11	323129035.00	617469116.08	60.4533	19534216491.57	102072.00	617571188.08	139837.00	241909	617711025.1	18916645303	1.91122	96.8385	0.00075	1

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JV_M	1	2006m12	18927163.00	36168023.74	59.084	1118292498.69	100128.00	36268151.74	150886.00	251014	36419037.74	1082024347	1.9162	96.7568	0.01326	1
JV_M	1	2007m1	18975909.00	71394628.00	54.5782	1035670956.58	99348.00	71493976.00	251537.00	350885	71745513	964176980.6	3.76762	93.0968	0.01849	1
JV_M	1	2007m2	16913472.00	63634951.11	58.5746	990699857.01	110268.00	63745219.11	251537.00	361805	63996756.11	926954637.9	3.7689	93.5656	0.02139	1
JV_M	1	2007m3	16754154.00	63035535.86	64.3595	1078288974.36	95255.00	63130790.86	281313.00	376568	63412103.86	1015158184	3.76807	94.1453	0.02248	1
JV_M	1	2007m4	14387533.00	54131402.42	68.6	986984763.80	90951.00	54222353.42	281313.00	372264	54503666.42	932762410.4	3.7687	94.5063	0.02587	1
JV_M	1	2007m5	6543548.00	24619330.50	68.88	450719586.24	121011.00	24740341.50	296150.00	417161	25036491.5	425979244.7	3.78088	94.5109	0.06375	1
JV_M	1	2007m6	6543548.00	24619330.50	68.88	450719586.24	92008.00	24711338.50	296150.00	388158	25007488.5	426008247.7	3.77644	94.5174	0.05932	1
JV_M	1	2007m7	6543548.00	24619330.50	68.88	450719586.24	106775.00	24726105.50	296150.00	402925	25022255.5	425993480.7	3.7787	94.5141	0.06158	1
JV_M	1	2007m8	6543548.00	24619330.50	68.88	450719586.24	154377.00	24773707.50	296150.00	450527	25069857.5	425945878.7	3.78597	94.5035	0.06885	1
JV_M	1	2007m9	6543548.00	24619330.50	68.88	450719586.24	102198.00	24721528.50	261775.00	363973	24983303.5	425998057.7	3.778	94.5151	0.05562	1
JV_M	1	2007m10	6543548.00	24619330.50	68.88	450719586.24	90432.00	24709762.50	261775.00	352207	24971537.5	426009823.7	3.7762	94.5177	0.05383	1
JV_M	1	2007m11	13070000.00	49174339.31	68.88	900261600.00	135130.00	49309469.31	300582.00	435712	49610051.31	850952130.7	3.77272	94.5228	0.03334	1
JV_M	1	200m712	0.00	0.00	68.88	0.00	106851.00	106851.00	300582.00	407433	407433	-106851				1
NJV_C	0	1999m1	621252.00	4977163.75	11.32	7032572.64	1662000.00	6639163.75	100000.00	1762000	6739163.753	393408.8874	10.6867	5.5941	2.83621	0
NJV_C	0	1999m2	572017.00	4582717.28	10.75	6149182.75	1746000.00	6328717.28	344000.00	2090000	6672717.284	-179534.5342	11.0639	-2.9196	3.65374	0
NJV_C	0	1999m3	634615.00	5084221.50	12.86	8161148.90	1640000.00	6724221.50	155000.00	1795000	6879221.499	1436927.401	10.5957	17.6069	2.82849	0
NJV_C	0	1999m4	595040.00	4767166.17	15.73	9359979.20	2297000.00	7064166.17	155000.00	2452000	7219166.173	2295813.027	11.8718	24.528	4.12073	0
NJV_C	0	1999m5	550725.00	4412136.31	16.12	8877687.00	2434000.00	6846136.31	736000.00	3170000	7582136.311	2031550.689	12.4311	22.8838	5.75605	0
NJV_C	0	1999m6	623117.00	4992105.21	16.24	10119420.08	2442000.00	7434105.21	1003000.00	3445000	8437105.21	2685314.87	11.9305	26.5363	5.52866	0
NJV_C	0	1999m7	576223.00	4616413.68	18.75	10804181.25	2877000.00	7493413.68	3716000.00	6593000	11209413.68	3310767.574	13.0044	30.6434	11.4418	0
NJV_C	0	1999m8	598082.00	4791537.17	20.21	12087237.22	3405000.00	8196537.17	5381000.00	8786000	13577537.17	3890700.048	13.7047	32.1885	14.6903	0
NJV_C	0	1999m9	586724.00	4700542.49	22.37	13125015.88	1792000.00	6492542.49	4800000.00	6592000	11292542.49	6632473.386	11.0658	50.5331	11.2353	0

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NJV_C	0	1999m10	612954.00	4910684.28	22.19	13601449.26	1731000.00	6641684.28	4800000.00	6531000	11441684.28	6959764.979	10.8355	51.1693	10.655	0
NJV_C	0	1999m11	595617.00	4771788.81	24.22	14425843.74	4655000.00	9426788.81	8100000.00	12755000	17526788.81	4999054.928	15.8269	34.6535	21.4148	0
NJV_C	0	1999m12	616205.00	4936729.68	25.01	15411287.05	4380000.00	9316729.68	7050000.00	11430000	16366729.68	6094557.365	15.1195	39.5461	18.549	0
NJV_C	0	2000m1	617442.00	5982990.92	25.21	15565712.82	4020000.00	10002990.92	4330000.00	8350000	14332990.92	5562721.905	16.2007	35.737	13.5235	0
NJV_C	0	2000m2	597026.00	5785160.60	27.15	16209255.90	7261000.00	13046160.60	6026000.00	13287000	19072160.6	3163095.295	21.8519	19.5141	22.2553	0
NJV_C	0	2000m3	623735.00	6043969.86	27.49	17146475.15	4824000.00	10867969.86	6026000.00	10850000	16893969.86	6278505.29	17.424	36.6169	17.3952	0
NJV_C	0	2000m4	603087.00	5843891.48	23.45	14142390.15	3028000.00	8871891.48	6026000.00	9054000	14897891.48	5270498.672	14.7108	37.2674	15.0128	0
NJV_C	0	2000m5	624452.00	6050917.56	27.23	17003827.96	3473000.00	9523917.56	7474000.00	10947000	16997917.56	7479910.395	15.2516	43.9896	17.5306	0
NJV_C	0	2000m6	605871.00	5870868.34	29.62	17945899.02	3048000.00	8918868.34	7797000.00	10845000	16715868.34	9027030.681	14.7207	50.3014	17.8998	0
NJV_C	0	2000m7	626952.00	6075142.48	28.16	17654968.32	5650000.00	11725142.48	12116000.00	17766000	23841142.48	5929825.845	18.7018	33.5873	28.3371	0
NJV_C	0	2000m8	628862.00	6093650.31	29.41	18494831.42	4929000.00	11022650.31	15123000.00	20052000	26145650.31	7472181.113	17.5279	40.4015	31.8862	0
NJV_C	0	2000m9	609539.00	5906411.13	32.08	19554011.12	6908000.00	12814411.13	17000000.00	23908000	29814411.13	6739599.993	21.0231	34.4666	39.2231	0
NJV_C	0	2000m10	625728.00	6063281.96	31.4	19647859.20	8886000.00	14949281.96	19000000.00	27886000	33949281.96	4698577.241	23.891	23.9139	44.5657	0
NJV_C	0	2000m11	612217.00	5932360.85	32.33	19792975.61	2940000.00	8872360.85	20000000.00	22940000	28872360.85	10920614.76	14.4922	55.1742	37.4704	0
NJV_C	0	2000m12	634191.00	6145288.13	25.28	16032348.48	5536000.00	11681288.13	22000000.00	27536000	33681288.13	4351060.354	18.4192	27.1393	43.4191	0
NJV_C	0	2001m1	647752.00	6664893.96	25.95	16809164.40	4885000.00	11549893.96	12000000.00	16885000	23549893.96	5259270.441	17.8307	31.2881	26.0671	0
NJV_C	0	2001m2	685508.00	7053375.56	27.24	18673237.92	4351000.00	11404375.56	12000000.00	16351000	23404375.56	7268862.356	16.6364	38.9266	23.8524	0
NJV_C	0	2001m3	598947.00	6162726.23	25.02	14985653.94	5336000.00	11498726.23	12000000.00	17336000	23498726.23	3486927.708	19.1982	23.2684	28.9441	0
NJV_C	0	2001m4	645245.00	6639098.76	25.66	16556986.70	5683000.00	12322098.76	12000000.00	17683000	24322098.76	4234887.936	19.0968	25.5776	27.4051	0
NJV_C	0	2001m5	661252.00	6803799.08	27.55	18217492.60	6206000.00	13009799.08	12000000.00	18206000	25009799.08	5207693.522	19.6745	28.5862	27.5326	0
NJV_C	0	2001m6	641804.00	6603693.39	26.97	17309453.88	7127000.00	13730693.39	12000000.00	19127000	25730693.39	3578760.487	21.3939	20.6752	29.8019	0
NJV_C	0	2001m7	657391.00	6764072.21	24.8	16303296.80	3721000.00	10485072.21	12000000.00	15721000	22485072.21	5818224.586	15.9495	35.6874	23.9142	0

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NJV_C	0	2001m8	659370.00	6784434.68	25.81	17018339.70	7368000.00	14152434.68	12000000.00	19368000	26152434.68	2865905.025	21.4636	16.8401	29.3735	0
NJV_C	0	2001m9	635989.00	6543861.30	25.03	15918804.67	4850000.00	11393861.30	9500000.00	14350000	20893861.3	4524943.371	17.9152	28.4251	22.5633	0
NJV_C	0	2001m10	655328.00	6742845.45	20.73	13584949.44	4381000.00	11123845.45	8000000.00	12381000	19123845.45	2461103.986	16.9745	18.1164	18.8928	0
NJV_C	0	2001m11	632989.00	6512993.49	18.69	11830564.41	3804000.00	10316993.49	8200000.00	12004000	18516993.49	1513570.915	16.2989	12.7937	18.964	0
NJV_C	0	2001m12	654556.00	6734902.14	18.52	12122377.12	4217000.00	10951902.14	8200000.00	12417000	19151902.14	1170474.981	16.7318	9.65549	18.9701	0
NJV_C	0	2002m1	643214.00	7906760.52	19.15	12317548.10	4173000.00	12079760.52	5400000.00	9573000	17479760.52	237787.5759	18.7803	1.93048	14.8831	0
NJV_C	0	2002m2	559952.00	6883255.60	19.98	11187840.96	3282000.00	10165255.60	5400000.00	8682000	15565255.6	1022585.358	18.1538	9.14015	15.5049	0
NJV_C	0	2002m3	593148.00	7291320.14	23.64	14022018.72	4395000.00	11686320.14	5300000.00	9695000	16986320.14	2335698.582	19.7022	16.6574	16.345	0
NJV_C	0	2002m4	498627.00	6129413.04	25.43	12680084.61	5255000.00	11384413.04	5300000.00	10555000	16684413.04	1295671.569	22.8315	10.2182	21.1681	0
NJV_C	0	2002m5	493269.00	6063549.39	25.69	12672080.61	3866000.00	9929549.39	5700000.00	9566000	15629549.39	2742531.221	20.1301	21.6423	19.3931	0
NJV_C	0	2002m6	479881.00	5898976.31	24.49	11752285.69	3609000.00	9507976.31	5900000.00	9509000	15407976.31	2244309.382	19.8132	19.0968	19.8153	0
NJV_C	0	2002m6	473958.00	5826167.35	25.75	12204418.50	4737000.00	10563167.35	7100000.00	11837000	17663167.35	1641251.152	22.2871	13.448	24.9748	0
NJV_C	0	2002m8	457683.00	5626105.58	26.78	12256750.74	5268000.00	10894105.58	7100000.00	12368000	17994105.58	1362645.156	23.8027	11.1175	27.0231	0
NJV_C	0	2002m9	422344.00	5191698.05	28.28	11943888.32	4687000.00	9878698.05	4500000.00	9187000	14378698.05	2065190.274	23.3902	17.2908	21.7524	0
NJV_C	0	2002m10	379686.00	4667321.10	27.53	10452755.58	3837000.00	8504321.10	5300000.00	9137000	13804321.1	1948434.476	22.3983	18.6404	24.0646	0
NJV_C	0	2002m11	410743.00	5049091.81	24.79	10182318.97	5171000.00	10220091.81	8100000.00	13271000	18320091.81	-37772.83762	24.882	-0.371	32.3097	0
NJV_C	0	2002m12	412664.00	5072705.86	27.89	11509198.96	5164000.00	10236705.86	8150000.00	13314000	18386705.86	1272493.103	24.8064	11.0563	32.2635	0
NJV_C	0	2003m1	404984.00	10259800.71	30.77	12461357.68	6605000.00	16864800.71	5300000.00	11905000	22164800.71	-4403443.026	41.6431	-35.337	29.3962	1
NJV_C	0	2003m2	372083.00	9426291.97	32.88	12234089.04	5857000.00	15283291.97	5300000.00	11157000	20583291.97	-3049202.927	41.075	-24.924	29.9852	1
NJV_C	0	2003m3	395261.00	10013479.76	30.36	12000123.96	7666000.00	17679479.76	5300000.00	12966000	22979479.76	-5679355.799	44.7286	-47.327	32.8036	1
NJV_C	0	2003m4	391205.00	9910725.70	25.49	9971815.45	5481000.00	15391725.70	5300000.00	10781000	20691725.7	-5419910.246	39.3444	-54.352	27.5584	1
NJV_C	0	2003m5	389085.00	9857017.95	26.06	10139555.10	5904000.00	15761017.95	11400000.00	17304000	27161017.95	-5621462.85	40.5079	-55.441	44.4736	1

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NJV_C	0	2003m6	368340.00	9331467.40	27.91	10280369.40	6718000.00	16049467.40	12400000.00	19118000	28449467.4	-5769097.996	43.5724	-56.118	51.9031	1
NJV_C	0	2003m7	355960.00	9017834.43	28.59	10176896.40	7540000.00	16557834.43	11600000.00	19140000	28157834.43	-6380938.031	46.516	-62.7	53.7701	1
NJV_C	0	2003m8	328407.00	8319811.08	29.68	9747119.76	5684000.00	14003811.08	10400000.00	16084000	24403811.08	-4256691.32	42.6416	-43.671	48.9758	1
NJV_C	0	2003m9	340328.00	8621815.81	26.88	9148016.64	7624000.00	16245815.81	17300000.00	24924000	33545815.81	-7097799.171	47.7358	-77.588	73.2352	1
NJV_C	0	2003m10	304928.00	7724997.80	29.01	8845961.28	6999000.00	14723997.80	20000000.00	26999000	34723997.8	-5878036.521	48.2868	-66.449	88.5422	1
NJV_C	0	2003m11	275044.00	6967921.26	29.12	8009281.28	6474000.00	13441921.26	25000000.00	31474000	38441921.26	-5432639.984	48.8719	-67.829	114.433	1
NJV_C	0	2003m12	289154.00	7325381.78	29.95	8660162.30	7392000.00	14717381.78	24000000.00	31392000	38717381.78	-6057219.476	50.8981	-69.943	108.565	1
NJV_C	0	2004m1	263081.00	8702662.21	31.4	8260743.40	5184000.00	13886662.21	5400000.00	10584000	19286662.21	-5625918.814	52.7847	-68.104	40.231	1
NJV_C	0	2004m2	228613.00	7562468.28	31.32	7160159.16	5353000.00	12915468.28	6200000.00	11553000	19115468.28	-5755309.116	56.4949	-80.38	50.5352	1
NJV_C	0	2004m3	181614.00	6007751.59	33.67	6114943.38	6142000.00	12149751.59	6200000.00	12342000	18349751.59	-6034808.207	66.8988	-98.69	67.9573	1
NJV_C	0	2004m4	90498.00	2993654.14	33.71	3050687.58	8180000.00	11173654.14	6200000.00	14380000	17373654.14	-8122966.561	123.469	-266.27	158.899	1
NJV_C	0	2004m5	86432.00	2859151.75	37.63	3252436.16	0.00	2859151.75	8100000.00	8100000	10959151.75	393284.4142	33.0798	12.092	93.7153	1
NJV_C	0	2004m6	68825.00	2276716.02	35.54	2446040.50	74000.00	2350716.02	9700000.00	9774000	12050716.02	95324.48154	34.155	3.89709	142.012	1
NJV_C	0	2004m7	0.00	0.00	37.93	0.00	5972000.00	5972000.00	12700000.00	18672000	18672000	-5972000				1
NJV_C	0	2004m8	87007.00	2878172.62	42.08	3661254.56	10181000.00	13059172.62	18000000.00	28181000	31059172.62	-9397918.061	150.093	-256.69	323.893	1
NJV_C	0	2004m9	140302.00	4641159.62	41.65	5843578.30	8640000.00	13281159.62	23000000.00	31640000	36281159.62	-7437581.32	94.6612	-127.28	225.514	1
NJV_C	0	2004m10	152365.00	5040201.03	46.87	7141347.55	10151000.00	15191201.03	28000000.00	38151000	43191201.03	-8049853.484	99.7027	-112.72	250.392	1
NJV_C	0	2004m11	148144.00	4900571.27	42.23	6256121.12	9942000.00	14842571.27	31000000.00	40942000	45842571.27	-8586450.153	100.19	-137.25	276.366	1
NJV_C	0	2004m12	145531.00	4814133.80	39.09	5688806.79	7311000.00	12125133.80	23000000.00	30311000	35125133.8	-6436327.011	83.3165	-113.14	208.279	1
NJV_C	0	2005m1	2594293.20	10117248.88	43.822	113687116.61	3018000.00	13135248.88	39492000.00	42510000	52627248.88	100551867.7	5.06313	88.4461	16.386	1
NJV_C	0	2005m2	2594293.20	10117248.88	46.9836	121889233.99	3018000.00	13135248.88	39492000.00	42510000	52627248.88	108753985.1	5.06313	89.2236	16.386	1
NJV_C	0	2005m3	2594293.20	10117248.88	53.2387	138116797.39	3018000.00	13135248.88	39492000.00	42510000	52627248.88	124981548.5	5.06313	90.4898	16.386	1

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
NJV_C	0	2005m4	2594293.20	10117248.88	52.1535	135301470.41	3018000.00	13135248.88	39492000.00	42510000	52627248.88	122166221.5	5.06313	90.2919	16.386	1
NJV_C	0	2005m5	2594293.20	10117248.88	48.7608	126499811.87	3018000.00	13135248.88	39492000.00	42510000	52627248.88	113364563	5.06313	89.6164	16.386	1
NJV_C	0	2005m6	2594293.20	10117248.88	54.3858	141092711.12	3018000.00	13135248.88	39492000.00	42510000	52627248.88	127957462.2	5.06313	90.6903	16.386	1
NJV_C	0	2005m7	2594293.20	10117248.88	58.7619	152445597.59	3018000.00	13135248.88	39492000.00	42510000	52627248.88	139310348.7	5.06313	91.3836	16.386	1
NJV_C	0	2005m8	2594293.20	10117248.88	65.3707	169590762.49	3018000.00	13135248.88	39492000.00	42510000	52627248.88	156455513.6	5.06313	92.2547	16.386	1
NJV_C	0	2005m9	2594293.20	10117248.88	63.8832	165731751.35	3018000.00	13135248.88	39492000.00	42510000	52627248.88	152596502.5	5.06313	92.0744	16.386	1
NJV_C	0	2005m10	2594293.20	10117248.88	60.87		3018000.00	13135248.88	39492000.00	42510000	52627248.88		5.06313		16.386	1
NJV_C	0	2005m11	2594293.20	10117248.88	55.1381	143044397.89	3018000.00	13135248.88	39492000.00	42510000	52627248.88	129909149	5.06313	90.8174	16.386	1
NJV_C	0	2005m12	2594293.20	10117248.88	58.3034	151256114.16	3018000.00	13135248.88	39492000.00	42510000	52627248.88	138120865.3	5.06313	91.3159	16.386	1
NJV_C	0	2006m1	2643876.00	16749779.02	63.4921	167865239.38	12561000.00	29310779.02	11200000.00	23761000	40510779.02	138554460.4	11.0863	82.5391	8.98718	1
NJV_C	0	2006m2	4675820.00	29622777.97	60.2523	281728909.39	14570000.00	44192777.97	10600000.00	25170000	54792777.97	237536131.4	9.45134	84.3137	5.38301	1
NJV_C	0	2006m3	2108491.00	13357948.07	62.1603	131064433.11	11023000.00	24380948.07	11000000.00	22023000	35380948.07	106683485	11.5632	81.3977	10.4449	1
NJV_C	0	2006m4	0.00	0.00		0.00	3847000.00	3847000.00	16000000.00	19847000	19847000	-3847000				1
NJV_C	0	2006m5	2441578.00	15468158.10	70.0808	171107739.50	22775000.00	38243158.10	18000000.00	40775000	56243158.1	132864581.4	15.6633	77.6497	16.7003	1
NJV_C	0	2006m6	0.00	0.00		0.00	13338000.00	13338000.00	19000000.00	32338000	32338000	-13338000				1
NJV_C	0	2006m7	2225343.00	14098241.93	74.2877	165315613.18	11452000.00	25550241.93	17500000.00	28952000	43050241.93	139765371.2	11.4815	84.5446	13.0101	1
NJV_C	0	2006m8	2489026.00	15768755.98	69.6639	173395258.36	10581000.00	26349755.98	18000000.00	28581000	44349755.98	147045502.4	10.5864	84.8036	11.4828	1
NJV_C	0	2006m9	2260757.00	14322600.67	63.1611	142791898.95	12157000.00	26479600.67	18000000.00	30157000	44479600.67	116312298.3	11.7127	81.4558	13.3393	1
NJV_C	0	2006m10	0.00	0.00	58.4447	0.00	12436000.00	12436000.00	14000000.00	26436000	26436000	-12436000				1
NJV_C	0	2006m11	0.00	0.00	60.4533	0.00	7380000.00	7380000.00	5000000.00	12380000	12380000	-7380000				1
NJV_C	0	2006m12	1746150.00	11062404.83	59.084	103169526.60	15241000.00	26303404.83	22000000.00	37241000	48303404.83	76866121.77	15.0637	74.5047	21.3275	1
NJV_C	0	2007m1	1602786.00	14618658.48	54.5782	87477174.87	7049000.00	21667658.48	12000000.00	19049000	33667658.48	65809516.39	13.5187	75.2305	11.8849	1

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NJV_C	0	2007m2	1430609.00	13048269.94	58.5746	83797349.93	4291000.00	17339269.94	13000000.00	17291000	30339269.94	66458079.99	12.1202	79.3081	12.0865	1
NJV_C	0	2007m3	1706183.00	15561719.76	64.3595	109809084.79	6880000.00	22441719.76	12000000.00	18880000	34441719.76	87367365.02	13.1532	79.563	11.0656	1
NJV_C	0	2007m4	1460754.00	13323215.85	68.6	100207724.40	8096000.00	21419215.85	14000000.00	22096000	35419215.85	78788508.55	14.6631	78.6252	15.1264	1
NJV_C	0	2007m5	1559387.00	14222825.74	68.88	107410576.56	8704000.00	22926825.74	17000000.00	25704000	39926825.74	84483750.82	14.7025	78.655	16.4834	1
NJV_C	0	2007m6	1559387.00	14222825.74	68.88	107410576.56	14039000.00	28261825.74	21000000.00	35039000	49261825.74	79148750.82	18.1237	73.688	22.4697	1
NJV_C	0	2007m7	1559387.00	14222825.74	68.88	107410576.56	7017000.00	21239825.74	17000000.00	24017000	38239825.74	86170750.82	13.6206	80.2256	15.4016	1
NJV_C	0	2007m8	1559387.00	14222825.74	68.88	107410576.56	8544000.00	22766825.74	20000000.00	28544000	42766825.74	84643750.82	14.5999	78.8039	18.3046	1
NJV_C	0	2007m9	1559387.00	14222825.74	68.88	107410576.56	11961000.00	26183825.74	27000000.00	38961000	53183825.74	81226750.82	16.7911	75.6227	24.9848	1
NJV_C	0	2007m10	1559387.00	14222825.74	68.88	107410576.56	16766000.00	30988825.74	38000000.00	54766000	68988825.74	76421750.82	19.8724	71.1492	35.1202	1
NJV_C	0	2007m11	1765000.00	16098176.68	68.88	121573200.00	18395000.00	34493176.68	54000000.00	72395000	88493176.68	87080023.32	19.5429	71.6276	41.017	1
NJV_C	0	200m712	0.00	0.00	68.88	0.00		0.00	5000000.00	5000000	5000000	0				1
NJV_P	0	1999m1	141570.00	977501.11	11.32	1602572.40	624000.00	1601501.11	47000.00	671000	1648501.108	1071.292224	11.3124	0.06685	4.7397	0
NJV_P	0	1999m2	75842.00	523667.72	10.75	815301.50	0.00	523667.72	0.00	0	523667.7193	291633.7807	6.90472	35.7701	0	0
NJV_P	0	1999m3	125730.00	868130.35	12.86	1616887.80	853000.00	1721130.35	24000.00	877000	1745130.354	-104242.5545	13.6891	-6.4471	6.97526	0
NJV_P	0	1999m4	134484.00	928574.27	15.73	2115433.32	0.00	928574.27	0.00	0	928574.267	1186859.053	6.90472	56.1048	0	0
NJV_P	0	1999m5	146213.00	1009559.72	16.12	2356953.56	0.00	1009559.72	0.00	0	1009559.719	1347393.841	6.90472	57.1668	0	0
NJV_P	0	1999m6	134314.00	927400.46	16.24	2181259.36	0.00	927400.46	0.00	0	927400.4647	1253858.895	6.90472	57.4833	0	0
NJV_P	0	1999m7	181901.00	1255975.34	18.75	3410643.75	0.00	1255975.34	0.00	0	1255975.341	2154668.409	6.90472	63.1748	0	0
NJV_P	0	1999m8	177786.00	1227562.42	20.21	3593055.06	0.00	1227562.42	0.00	0	1227562.421	2365492.639	6.90472	65.8351	0	0
NJV_P	0	1999m9	190835.00	1317662.10	22.37	4268978.95	538000.00	1855662.10	8000.00	546000	1863662.103	2413316.847	9.72391	56.5315	2.86111	0
NJV_P	0	1999m10	194145.00	1340516.72	22.19	4308077.55	0.00	1340516.72	0.00	0	1340516.724	2967560.826	6.90472	68.8836	0	0
NJV_P	0	1999m11	236565.00	1633414.92	24.22	5729604.30	685000.00	2318414.92	8000.00	693000	2326414.915	3411189.385	9.80033	59.5362	2.92943	0

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NJV_P	0	1999m12	260117.00	1796034.86	25.01	6505526.17	0.00	1796034.86	0.00	0	1796034.864	4709491.306	6.90472	72.3922	0	0
NJV_P	0	2000m1	261670.00	874905.72	25.21	6596700.70	952000.00	1826905.72	8000.00	960000	1834905.722	4769794.978	6.98172	72.3058	3.66874	0
NJV_P	0	2000m2	246349.00	823679.25	27.15	6688375.35	0.00	823679.25	0.00	0	823679.2515	5864696.099	3.34355	87.6849	0	0
NJV_P	0	2000m3	250669.00	838123.37	27.49	6890890.81	1564000.00	2402123.37	223000.00	1787000	2625123.371	4488767.439	9.58285	65.1406	7.12892	0
NJV_P	0	2000m4	246635.00	824635.51	23.45	5783590.75	0.00	824635.51	0.00	0	824635.5057	4958955.244	3.34355	85.7418	0	0
NJV_P	0	2000m5	396405.00	1325398.41	27.23	10794108.15	1564000.00	2889398.41	223000.00	1787000	3112398.413	7904709.737	7.28901	73.2317	4.50802	0
NJV_P	0	2000m6	347807.00	1162908.76	29.62	10302043.34	658000.00	1820908.76	74000.00	732000	1894908.757	8481134.583	5.2354	82.3248	2.10462	0
NJV_P	0	2000m7	389239.00	1301438.56	28.16	10960970.24	846000.00	2147438.56	74000.00	920000	2221438.561	8813531.679	5.51702	80.4083	2.36359	0
NJV_P	0	2000m8	199586.00	667325.00	29.41	5869824.26	686000.00	1353325.00	74000.00	760000	1427325.003	4516499.257	6.78066	76.9444	3.80788	0
NJV_P	0	2000m9	96066.00	321201.10	32.08	3081797.28	888000.00	1209201.10	74000.00	962000	1283201.105	1872596.175	12.5872	60.7631	10.0139	0
NJV_P	0	2000m10	358345.00	1198143.05	31.4	11252033.00	474000.00	1672143.05	74000.00	548000	1746143.046	9579889.954	4.66629	85.1392	1.52925	0
NJV_P	0	2000m11	540246.00	1806337.44	32.33	17466153.18	888000.00	2694337.44	247000.00	1135000	2941337.435	14771815.74	4.98724	84.574	2.10089	0
NJV_P	0	2000m12	456865.00	1527549.21	25.28	11549547.20	1509000.00	3036549.21	0.00	1509000	3036549.214	8512997.986	6.64649	73.7085	3.30295	0
NJV_P	0	2001m1	470851.00	1100032.46	25.95	12218583.45	1509000.00	2609032.46	247000.00	1756000	2856032.459	9609550.991	5.5411	78.647	3.72942	0
NJV_P	0	2001m2	577870.00	1350057.15	27.24	15741178.80	1188000.00	2538057.15	247000.00	1435000	2785057.146	13203121.65	4.39209	83.8763	2.48326	0
NJV_P	0	2001m3	322165.00	752662.64	25.02	8060568.30	1560000.00	2312662.64	155000.00	1715000	2467662.641	5747905.659	7.1785	71.3089	5.32336	0
NJV_P	0	2001m4	372450.00	870141.70	25.66	9557067.00	623000.00	1493141.70	155000.00	778000	1648141.7	8063925.3	4.00897	84.3766	2.08887	0
NJV_P	0	2001m5	334453.00	781370.66	27.55	9214180.15	623000.00	1404370.66	155000.00	778000	1559370.659	7809809.491	4.19901	84.7586	2.32619	0
NJV_P	0	2001m6	436905.00	1020725.63	26.97	11783327.85	1273000.00	2293725.63	155000.00	1428000	2448725.626	9489602.224	5.24994	80.5341	3.26845	0
NJV_P	0	2001m7	435288.00	1016947.89	24.8	10795142.40	591000.00	1607947.89	155000.00	746000	1762947.886	9187194.514	3.69399	85.1049	1.71381	0
NJV_P	0	2001m8	428274.00	1000561.33	25.81	11053751.94	591000.00	1591561.33	155000.00	746000	1746561.327	9462190.613	3.71622	85.6016	1.74188	0
NJV_P	0	2001m9	419415.00	979864.36	25.03	10497957.45	830000.00	1809864.36	155000.00	985000	1964864.36	8688093.09	4.31521	82.7598	2.34851	0

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NJV_P	0	2001m10	466782.00	1090526.20	20.73	9676390.86	806000.00	1896526.20	116000.00	922000	2012526.199	7779864.661	4.06298	80.4005	1.97523	0
NJV_P	0	2001m11	419744.00	980632.99	18.69	7845015.36	806000.00	1786632.99	311000.00	1117000	2097632.991	6058382.369	4.25648	77.2259	2.66115	0
NJV_P	0	2001m12	454746.00	1062406.92	18.52	8421895.92	1338000.00	2400406.92	0.00	1338000	2400406.92	6021489	5.27857	71.498	2.9423	0
NJV_P	0	2002m1	424724.00	2087455.73	19.15	8133464.60	1338000.00	3425455.73	311000.00	1649000	3736455.732	4708008.868	8.06513	57.8844	3.88252	0
NJV_P	0	2002m2	332748.00	1635407.28	19.98	6648305.04	1297000.00	2932407.28	0.00	1297000	2932407.276	3715897.764	8.8127	55.8924	3.89784	0
NJV_P	0	2002m3	357535.00	1757231.72	23.64	8452127.40	652000.00	2409231.72	168000.00	820000	2577231.721	6042895.679	6.73845	71.4956	2.29348	0
NJV_P	0	2002m4	347156.00	1706220.47	25.43	8828177.08	527000.00	2233220.47	168000.00	695000	2401220.468	6594956.612	6.4329	74.7035	2.00198	0
NJV_P	0	2002m5	326652.00	1605446.34	25.69	8391689.88	549000.00	2154446.34	168000.00	717000	2322446.337	6237243.543	6.59554	74.3264	2.195	0
NJV_P	0	2002m6	323199.00	1588475.35	24.49	7915143.51	699000.00	2287475.35	168000.00	867000	2455475.352	5627668.158	7.07761	71.1	2.68256	0
NJV_P	0	2002m6	309292.00	1520124.50	25.75	7964269.00	623000.00	2143124.50	168000.00	791000	2311124.501	5821144.499	6.92913	73.0908	2.55745	0
NJV_P	0	2002m8	363883.00	1788431.20	26.78	9744786.74	623000.00	2411431.20	168000.00	791000	2579431.203	7333355.537	6.62694	75.2541	2.17378	0
NJV_P	0	2002m9	330001.00	1621906.18	28.28	9332428.28	632000.00	2253906.18	168000.00	800000	2421906.177	7078522.103	6.83	75.8487	2.42424	0
NJV_P	0	2002m10	466782.00	2294164.59	27.53	12850508.46	771000.00	3065164.59	168000.00	939000	3233164.591	9785343.869	6.56659	76.1475	2.01165	0
NJV_P	0	2002m11	419774.00	2063127.21	24.79	10406197.46	1403000.00	3466127.21	337000.00	1740000	3803127.214	6940070.246	8.25713	66.6917	4.14509	0
NJV_P	0	2002m12	454746.00	2235009.43	27.89	12682865.94	1430000.00	3665009.43	0.00	1430000	3665009.428	9017856.512	8.05946	71.1027	3.14461	0
NJV_P	0	2003m1	389723.00	2243024.49	30.77	11991776.71	708000.00	2951024.49	168000.00	876000	3119024.488	9040752.222	7.57211	75.3913	2.24775	1
NJV_P	0	2003m2	346939.00	1996784.06	32.88	11407354.32	912000.00	2908784.06	168000.00	1080000	3076784.057	8498570.263	8.38414	74.5008	3.11294	1
NJV_P	0	2003m3	390401.00	2246926.67	30.36	11852574.36	879000.00	3125926.67	497000.00	1376000	3622926.672	8726647.688	8.00696	73.6266	3.52458	1
NJV_P	0	2003m4	371879.00	2140324.55	25.49	9479195.71	892000.00	3032324.55	497000.00	1389000	3529324.548	6446871.162	8.15406	68.0107	3.73509	1
NJV_P	0	2003m5	393513.00	2264837.58	26.06	10254948.78	955000.00	3219837.58	497000.00	1452000	3716837.578	7035111.202	8.18229	68.6021	3.68984	1
NJV_P	0	2003m6	378845.00	2180416.89	27.91	10573563.95	0.00	2180416.89	543000.00	543000	2723416.892	8393147.058	5.75543	79.3786	1.4333	1
NJV_P	0	2003m7	408090.00	2348734.52	28.59	11667293.10	1011000.00	3359734.52	543000.00	1554000	3902734.52	8307558.58	8.23283	71.2038	3.80798	1

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
NJV_P	0	2003m8	345855.00	1990545.17	29.68	10264976.40	843000.00	2833545.17	543000.00	1386000	3376545.168	7431431.232	8.19287	72.396	4.00746	1
NJV_P	0	2003m9	334173.00	1923310.20	26.88	8982570.24	926000.00	2849310.20	543000.00	1469000	3392310.203	6133260.037	8.52645	68.2796	4.39593	1
NJV_P	0	2003m10	356647.00	2052657.80	29.01	10346329.47	833000.00	2885657.80	543000.00	1376000	3428657.797	7460671.673	8.09108	72.1094	3.85816	1
NJV_P	0	2003m11	372942.00	2146442.57	29.12	10860071.04	725000.00	2871442.57	543000.00	1268000	3414442.573	7988628.467	7.69943	73.5596	3.39999	1
NJV_P	0	2003m12	384158.00	2210995.51	29.95	11505532.10	859000.00	3069995.51	543000.00	1402000	3612995.505	8435536.595	7.99149	73.3172	3.64954	1
NJV_P	0	2004m1	434730.00	2606136.77	31.4	13650522.00	854000.00	3460136.77	543000.00	1397000	4003136.769	10190385.23	7.95928	74.652	3.21349	1
NJV_P	0	2004m2	460735.00	2762032.58	31.32	14430220.20	885000.00	3647032.58	543000.00	1428000	4190032.582	10783187.62	7.91568	74.7264	3.0994	1
NJV_P	0	2004m3	592210.00	3550204.16	33.67	19939710.70	1023000.00	4573204.16	799000.00	1822000	5372204.164	15366506.54	7.72227	77.0648	3.07661	1
NJV_P	0	2004m4	640736.00	3841109.77	33.71	21599210.56	1051000.00	4892109.77	799000.00	1850000	5691109.767	16707100.79	7.63514	77.3505	2.8873	1
NJV_P	0	2004m5	671043.00	4022795.38	37.63	25251348.09	1352000.00	5374795.38	799000.00	2151000	6173795.381	19876552.71	8.00961	78.7148	3.20546	1
NJV_P	0	2004m6	650548.00	3899931.14	35.54	23120475.92	1875000.00	5774931.14	799000.00	2674000	6573931.137	17345544.78	8.87703	75.0224	4.11038	1
NJV_P	0	2004m7	679012.00	4070568.26	37.93	25754925.16	1851000.00	5921568.26	799000.00	2650000	6720568.261	19833356.9	8.72086	77.008	3.90273	1
NJV_P	0	2004m8	650800.00	3901441.84	42.08	27385664.00	2095000.00	5996441.84	799000.00	2894000	6795441.836	21389222.16	9.21395	78.1037	4.44683	1
NJV_P	0	2004m9	652464.00	3911417.25	41.65	27175125.60	2024000.00	5935417.25	799000.00	2823000	6734417.25	21239708.35	9.09693	78.1586	4.32668	1
NJV_P	0	2004m10	692301.00	4150233.69	46.87	32448147.87	1042000.00	5192233.69	799000.00	1841000	5991233.689	27255914.18	7.49997	83.9984	2.65925	1
NJV_P	0	2004m11	682547.00	4091760.02	42.23	28823959.81	2687000.00	6778760.02	799000.00	3486000	7577760.02	22045199.79	9.93157	76.4822	5.10734	1
NJV_P	0	2004m12	712174.00	4269369.14	39.09	27838881.66	2396000.00	6665369.14	799000.00	3195000	7464369.143	21173512.52	9.35919	76.0573	4.48626	1
NJV_P	0	2005m1	656485.00	8993845.04	43.822	28768485.67	13649000.00	22642845.04	25233333.00	38882333	47876178.04	6125640.63	34.491	21.2929	59.2281	1
NJV_P	0	2005m2	681724.00	9339619.36	46.9836	32029847.73	13649000.00	22988619.36	25233333.00	38882333	48221952.36	9041228.366	33.7213	28.2275	57.0353	1
NJV_P	0	2005m3	673068.00	9221032.15	53.2387	35833265.33	13649000.00	22870032.15	25233333.00	38882333	48103365.15	12963233.18	33.9788	36.1765	57.7688	1
NJV_P	0	2005m4	726518.00	9953297.20	52.1535	37890456.51	13649000.00	23602297.20	25233333.00	38882333	48835630.2	14288159.32	32.4869	37.7091	53.5187	1
NJV_P	0	2005m5	752101.00	10303784.32	48.7608	36673046.44	13649000.00	23952784.32	25233333.00	38882333	49186117.32	12720262.12	31.8478	34.6856	51.6983	1

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NJV_P	0	2005m6	715165.00	9797761.09	54.3858	38894820.66	13649000.00	23446761.09	25233333.00	38882333	48680094.09	15448059.57	32.7851	39.7175	54.3683	1
NJV_P	0	2005m7	744279.00	10196622.91	58.7619	43735248.17	13649000.00	23845622.91	25233333.00	38882333	49078955.91	19889625.26	32.0386	45.4773	52.2416	1
NJV_P	0	2005m8	740540.00	10145398.61	65.3707	48409618.18	13649000.00	23794398.61	25233333.00	38882333	49027731.61	24615219.57	32.1311	50.8478	52.5054	1
NJV_P	0	2005m9	734963.00	10068993.70	63.8832	46951788.32	13649000.00	23717993.70	25233333.00	38882333	48951326.7	23233794.62	32.271	49.4844	52.9038	1
NJV_P	0	2005m10	691813.00	9477838.67	60.87		13649000.00	23126838.67	25233333.00	38882333	48360171.67		33.4293		56.2035	1
NJV_P	0	2005m11	775570.00	10625309.64	55.1381	42763456.22	13649000.00	24274309.64	25233333.00	38882333	49507642.64	18489146.58	31.2987	43.2359	50.1339	1
NJV_P	0	2005m12	739488.00	10130986.21	58.3034	43114664.66	13649000.00	23779986.21	25233333.00	38882333	49013319.21	19334678.45	32.1574	44.8448	52.5801	1
NJV_P	0	2006m1	799658.00	41957836.84	63.4921	50771965.70	3683000.00	45640836.84		3683000	45640836.84	5131128.863	57.0754	10.1062	4.60572	1
NJV_P	0	2006m2	404823.00	21240952.24	60.2523	24391516.84	10419000.00	31659952.24		10419000	31659952.24	-7268435.392	78.2069	-29.799	25.7372	1
NJV_P	0	2006m3	404823.00	21240952.24	62.1603	25163919.13	7343000.00	28583952.24		7343000	28583952.24	-3420033.108	70.6085	-13.591	18.1388	1
NJV_P	0	2006m4	404823.00	21240952.24		0.00		21240952.24		0	21240952.24	-21240952.24	52.4697		0	1
NJV_P	0	2006m5	404823.00	21240952.24	70.0808	28370319.70		21240952.24		0	21240952.24	7129367.463	52.4697	25.1297	0	1
NJV_P	0	2006m6	404823.00	21240952.24		0.00		21240952.24		0	21240952.24	-21240952.24	52.4697		0	1
NJV_P	0	2006m7	404823.00	21240952.24	74.2877	30073369.58		21240952.24		0	21240952.24	8832417.342	52.4697	29.3696	0	1
NJV_P	0	2006m8	404823.00	21240952.24	69.6639	28201548.99		21240952.24		0	21240952.24	6960596.754	52.4697	24.6816	0	1
NJV_P	0	2006m9	404823.00	21240952.24	63.1611	25569065.99		21240952.24		0	21240952.24	4328113.75	52.4697	16.9271	0	1
NJV_P	0	2006m10	404823.00	21240952.24	58.4447	23659758.79		21240952.24		0	21240952.24	2418806.553	52.4697	10.2233	0	1
NJV_P	0	2006m11	404823.00	21240952.24	60.4533	24472886.27		21240952.24		0	21240952.24	3231934.031	52.4697	13.2062	0	1
NJV_P	0	2006m12	404823.00	21240952.24	59.084	23918562.13		21240952.24		0	21240952.24	2677609.897	52.4697	11.1947	0	1
NJV_P	0	2007m1	404823.00	20440679.37	54.5782	22094510.66		20440679.37		0	20440679.37	1653831.288	50.4929	7.48526	0	1
NJV_P	0	2007m2	404823.00	20440679.37	58.5746	23712345.30		20440679.37		0	20440679.37	3271665.925	50.4929	13.7973	0	1
NJV_P	0	2007m3	404823.00	20440679.37	64.3595	26054205.87		20440679.37		0	20440679.37	5613526.498	50.4929	21.5456	0	1

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
NJV_P	0	2007m4	404823.00	20440679.37	68.6	27770857.80		20440679.37		0	20440679.37	7330178.43	50.4929	26.3952	0	1
NJV_P	0	2007m5	404823.00	20440679.37	68.88	27884208.24		20440679.37		0	20440679.37	7443528.87	50.4929	26.6944	0	1
NJV_P	0	2007m6	404823.00	20440679.37	68.88	27884208.24		20440679.37		0	20440679.37	7443528.87	50.4929	26.6944	0	1
NJV_P	0	2007m7	404823.00	20440679.37	68.88	27884208.24		20440679.37		0	20440679.37	7443528.87	50.4929	26.6944	0	1
NJV_P	0	2007m8	404823.00	20440679.37	68.88	27884208.24		20440679.37		0	20440679.37	7443528.87	50.4929	26.6944	0	1
NJV_P	0	2007m9	404823.00	20440679.37	68.88	27884208.24		20440679.37		0	20440679.37	7443528.87	50.4929	26.6944	0	1
NJV_P	0	2007m10	404823.00	20440679.37	68.88	27884208.24		20440679.37		0	20440679.37	7443528.87	50.4929	26.6944	0	1
NJV_P	0	2007m11	404823.00	20440679.37	68.88	27884208.24		20440679.37		0	20440679.37	7443528.87	50.4929	26.6944	0	1
NJV_P	0	200m712	404823.00	20440679.37	68.88	27884208.24		20440679.37		0	20440679.37	7443528.87	50.4929	26.6944	0	1
NJV_A	0	1999m1	317177.00	1182400.75	11.32	3590443.64	0.00	1182400.75	0.00	0	1182400.749	2408042.891	3.72789	67.0681	0	0
NJV_A	0	1999m2	270000.00	1006530.12	10.75	2902500.00	0.00	1006530.12	0.00	0	1006530.115	1895969.885	3.72789	65.322	0	0
NJV_A	0	1999m3	313371.00	1168212.40	12.86	4029951.06	0.00	1168212.40	0.00	0	1168212.403	2861738.657	3.72789	71.0117	0	0
NJV_A	0	1999m4	294039.00	1096144.85	15.73	4625233.47	0.00	1096144.85	0.00	0	1096144.846	3529088.624	3.72789	76.3008	0	0
NJV_A	0	1999m5	298621.00	1113226.04	16.12	4813770.52	0.00	1113226.04	0.00	0	1113226.035	3700544.485	3.72789	76.8741	0	0
NJV_A	0	1999m6	307186.00	1145155.41	16.24	4988700.64	0.00	1145155.41	0.00	0	1145155.407	3843545.233	3.72789	77.045	0	0
NJV_A	0	1999m7	303912.00	1132950.30	18.75	5698350.00	0.00	1132950.30	0.00	0	1132950.297	4565399.703	3.72789	80.1179	0	0
NJV_A	0	1999m8	286134.00	1066675.88	20.21	5782768.14	0.00	1066675.88	0.00	0	1066675.881	4716092.259	3.72789	81.5542	0	0
NJV_A	0	1999m9	275749.00	1027961.75	22.37	6168505.13	0.00	1027961.75	0.00	0	1027961.751	5140543.379	3.72789	83.3353	0	0
NJV_A	0	1999m10	273403.00	1019216.12	22.19	6066812.57	0.00	1019216.12	0.00	0	1019216.122	5047596.448	3.72789	83.2001	0	0
NJV_A	0	1999m11	278032.00	1036472.52	24.22	6733935.04	0.00	1036472.52	0.00	0	1036472.522	5697462.518	3.72789	84.6082	0	0
NJV_A	0	1999m12	269604.00	1005053.87	25.01	6742796.04	0.00	1005053.87	0.00	0	1005053.871	5737742.169	3.72789	85.0944	0	0
NJV_A	0	2000m1	305482.00	1027439.07	25.21	7701201.22	0.00	1027439.07	0.00	0	1027439.068	6673762.152	3.36334	86.6587	0	0

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NJV_A	0	2000m2	294357.00	990021.94	27.15	7991792.55	0.00	990021.94	0.00	0	990021.9386	7001770.611	3.36334	87.612	0	0
NJV_A	0	2000m3	296462.00	997101.76	27.49	8149740.38	0.00	997101.76	0.00	0	997101.764	7152638.616	3.36334	87.7652	0	0
NJV_A	0	2000m4	287908.00	968331.77	23.45	6751442.60	0.00	968331.77	0.00	0	968331.775	5783110.825	3.36334	85.6574	0	0
NJV_A	0	2000m5	306915.00	1032258.73	27.23	8357295.45	0.00	1032258.73	0.00	0	1032258.731	7325036.719	3.36334	87.6484	0	0
NJV_A	0	2000m6	340989.00	1146861.09	29.62	10100094.18	0.00	1146861.09	0.00	0	1146861.093	8953233.087	3.36334	88.645	0	0
NJV_A	0	2000m7	369799.00	1243758.85	28.16	10413539.84	0.00	1243758.85	0.00	0	1243758.847	9169780.993	3.36334	88.0563	0	0
NJV_A	0	2000m8	400384.00	1346626.52	29.41	11775293.44	0.00	1346626.52	0.00	0	1346626.524	10428666.92	3.36334	88.564	0	0
NJV_A	0	2000m9	391636.00	1317204.05	32.08	12563682.88	0.00	1317204.05	0.00	0	1317204.048	11246478.83	3.36334	89.5158	0	0
NJV_A	0	2000m10	394918.00	1328242.52	31.4	12400425.20	0.00	1328242.52	0.00	0	1328242.522	11072182.68	3.36334	89.2887	0	0
NJV_A	0	2000m11	374422.00	1259307.56	32.33	12105063.26	0.00	1259307.56	0.00	0	1259307.556	10845755.7	3.36334	89.5969	0	0
NJV_A	0	2000m12	399260.00	1342846.13	25.28	10093292.80	0.00	1342846.13	0.00	0	1342846.133	8750446.667	3.36334	86.6957	0	0
NJV_A	0	2001m1	407948.00	1170520.92	25.95	10586250.60	0.00	1170520.92	0.00	0	1170520.92	9415729.68	2.86929	88.943	0	0
NJV_A	0	2001m2	367238.00	1053712.14	27.24	10003563.12	0.00	1053712.14	0.00	0	1053712.143	8949850.977	2.86929	89.4666	0	0
NJV_A	0	2001m3	410318.00	1177321.14	25.02	10266156.36	0.00	1177321.14	0.00	0	1177321.136	9088835.224	2.86929	88.532	0	0
NJV_A	0	2001m4	420706.00	1207127.32	25.66	10795315.96	0.00	1207127.32	0.00	0	1207127.315	9588188.645	2.86929	88.818	0	0
NJV_A	0	2001m5	450092.00	1291444.26	27.55	12400034.60	0.00	1291444.26	0.00	0	1291444.257	11108590.34	2.86929	89.5852	0	0
NJV_A	0	2001m6	412531.00	1183670.87	26.97	11125961.07	0.00	1183670.87	0.00	0	1183670.873	9942290.197	2.86929	89.3612	0	0
NJV_A	0	2001m7	431868.00	1239154.32	24.8	10710326.40	0.00	1239154.32	0.00	0	1239154.325	9471172.075	2.86929	88.4303	0	0
NJV_A	0	2001m8	419231.00	1202895.11	25.81	10820352.11	0.00	1202895.11	0.00	0	1202895.113	9617456.997	2.86929	88.883	0	0
NJV_A	0	2001m9	425725.00	1221528.28	25.03	10655896.75	0.00	1221528.28	0.00	0	1221528.279	9434368.471	2.86929	88.5366	0	0
NJV_A	0	2001m10	519569.00	1490793.88	20.73	10770665.37	0.00	1490793.88	0.00	0	1490793.885	9279871.485	2.86929	86.1588	0	0
NJV_A	0	2001m11	488125.00	1400571.95	18.69	9123056.25	0.00	1400571.95	0.00	0	1400571.945	7722484.305	2.86929	84.648	0	0

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NJV_A	0	2001m12	474424.00	1361259.81	18.52	8786332.48	0.00	1361259.81	0.00	0	1361259.809	7425072.671	2.86929	84.5071	0	0
NJV_A	0	2002m1	467114.00	9582435.66	19.15	8945233.10	0.00	9582435.66	0.00	0	9582435.663	-637202.5635	20.5141	-7.1234	0	0
NJV_A	0	2002m2	394835.00	8099695.12	19.98	7888803.30	0.00	8099695.12	0.00	0	8099695.118	-210891.8176	20.5141	-2.6733	0	0
NJV_A	0	2002m3	472508.00	9693088.86	23.64	11170089.12	0.00	9693088.86	0.00	0	9693088.862	1477000.258	20.5141	13.2228	0	0
NJV_A	0	2002m4	353927.00	7260503.23	25.43	9000363.61	0.00	7260503.23	0.00	0	7260503.233	1739860.377	20.5141	19.331	0	0
NJV_A	0	2002m5	367268.00	7534182.19	25.69	9435114.92	0.00	7534182.19	0.00	0	7534182.194	1900932.726	20.5141	20.1474	0	0
NJV_A	0	2002m6	343693.00	7050561.66	24.49	8417041.57	0.00	7050561.66	0.00	0	7050561.663	1366479.907	20.5141	16.2347	0	0
NJV_A	0	2002m6	318411.00	6531923.52	25.75	8199083.25	0.00	6531923.52	0.00	0	6531923.518	1667159.732	20.5141	20.3335	0	0
NJV_A	0	2002m8	295210.00	6055975.27	26.78	7905723.80	0.00	6055975.27	0.00	0	6055975.27	1849748.53	20.5141	23.3976	0	0
NJV_A	0	2002m9	298877.00	6131200.57	28.28	8452241.56	0.00	6131200.57	0.00	0	6131200.572	2321040.988	20.5141	27.4607	0	0
NJV_A	0	2002m10	311585.00	6391894.09	27.53	8577935.05	0.00	6391894.09	0.00	0	6391894.091	2186040.959	20.5141	25.4845	0	0
NJV_A	0	2002m11	303134.00	6218529.21	24.79	7514691.86	0.00	6218529.21	0.00	0	6218529.208	1296162.652	20.5141	17.2484	0	0
NJV_A	0	2002m12	314418.00	6450010.61	27.89	8769118.02	0.00	6450010.61	0.00	0	6450010.611	2319107.409	20.5141	26.4463	0	0
NJV_A	0	2003m1	313032.00	7457494.13	30.77	9631994.64	0.00	7457494.13	0.00	0	7457494.132	2174500.508	23.8234	22.5758	0	1
NJV_A	0	2003m2	274557.00	6540887.88	32.88	9027434.16	0.00	6540887.88	0.00	0	6540887.885	2486546.275	23.8234	27.5443	0	1
NJV_A	0	2003m3	309447.00	7372087.16	30.36	9394810.92	0.00	7372087.16	0.00	0	7372087.156	2022723.764	23.8234	21.5302	0	1
NJV_A	0	2003m4	301677.00	7186979.15	25.49	7689746.73	0.00	7186979.15	0.00	0	7186979.15	502767.5804	23.8234	6.53816	0	1
NJV_A	0	2003m5	301877.00	7191743.83	26.06	7866914.62	0.00	7191743.83	0.00	0	7191743.834	675170.7855	23.8234	8.58241	0	1
NJV_A	0	2003m6	295655.00	7043514.49	27.91	8251731.05	0.00	7043514.49	0.00	0	7043514.489	1208216.561	23.8234	14.642	0	1
NJV_A	0	2003m7	303670.00	7234459.23	28.59	8681925.30	0.00	7234459.23	0.00	0	7234459.234	1447466.066	23.8234	16.6722	0	1
NJV_A	0	2003m8	262583.00	6255626.20	29.68	7793463.44	0.00	6255626.20	0.00	0	6255626.203	1537837.237	23.8234	19.7324	0	1
NJV_A	0	2003m9	272008.00	6480161.98	26.88	7311575.04	0.00	6480161.98	0.00	0	6480161.976	831413.0637	23.8234	11.3712	0	1

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
NJV_A	0	2003m10	288753.00	6879085.21	29.01	8376724.53	0.00	6879085.21	0.00	0	6879085.215	1497639.315	23.8234	17.8786	0	1
NJV_A	0	2003m11	275320.00	6559065.16	29.12	8017318.40	0.00	6559065.16	0.00	0	6559065.157	1458253.243	23.8234	18.1888	0	1
NJV_A	0	2003m12	285387.00	6798895.57	29.95	8547340.65	0.00	6798895.57	0.00	0	6798895.569	1748445.081	23.8234	20.456	0	1
NJV_A	0	2004m1	280523.00	10792251.76	31.4	8808422.20	0.00	10792251.76	0.00	0	10792251.76	-1983829.56	38.4719	-22.522	0	1
NJV_A	0	2004m2	256145.00	9854383.87	31.32	8022461.40	0.00	9854383.87	0.00	0	9854383.873	-1831922.473	38.4719	-22.835	0	1
NJV_A	0	2004m3	305164.00	11740237.76	33.67	10274871.88	0.00	11740237.76	0.00	0	11740237.76	-1465365.876	38.4719	-14.262	0	1
NJV_A	0	2004m4	311354.00	11978378.79	33.71	10495743.34	0.00	11978378.79	0.00	0	11978378.79	-1482635.454	38.4719	-14.126	0	1
NJV_A	0	2004m5	335386.00	12902935.41	37.63	12620575.18	0.00	12902935.41	0.00	0	12902935.41	-282360.2257	38.4719	-2.2373	0	1
NJV_A	0	2004m6	353218.00	13588966.26	35.54	12553367.72	0.00	13588966.26	0.00	0	13588966.26	-1035598.54	38.4719	-8.2496	0	1
NJV_A	0	2004m7	398149.00	15317547.03	37.93	15101791.57	0.00	15317547.03	0.00	0	15317547.03	-215755.4619	38.4719	-1.4287	0	1
NJV_A	0	2004m8	390111.00	15008309.93	42.08	16415870.88	0.00	15008309.93	0.00	0	15008309.93	1407560.95	38.4719	8.57439	0	1
NJV_A	0	2004m9	322058.00	12390181.97	41.65	13413715.70	0.00	12390181.97	0.00	0	12390181.97	1023533.728	38.4719	7.6305	0	1
NJV_A	0	2004m10	342254.00	13167160.39	46.87	16041444.98	0.00	13167160.39	0.00	0	13167160.39	2874284.591	38.4719	17.9179	0	1
NJV_A	0	2004m11	330060.00	12698034.09	42.23	13938433.80	0.00	12698034.09	0.00	0	12698034.09	1240399.714	38.4719	8.89913	0	1
NJV_A	0	2004m12	274528.00	10561612.74	39.09	10731299.52	0.00	10561612.74	0.00	0	10561612.74	169686.7781	38.4719	1.58123	0	1
NJV_A	0	2005m1	308015.00	8847149.27	43.822	13497833.33		8847149.27		0	8847149.266	4650684.064	28.7231	34.455	0	1
NJV_A	0	2005m2	300419.00	8628968.51	46.9836	14114766.13		8628968.51		0	8628968.509	5485797.619	28.7231	38.8657	0	1
NJV_A	0	2005m3	380044.00	10916046.28	53.2387	20233048.50		10916046.28		0	10916046.28	9317002.221	28.7231	46.0484	0	1
NJV_A	0	2005m4	358292.00	10291261.16	52.1535	18686181.82		10291261.16		0	10291261.16	8394920.667	28.7231	44.9258	0	1
NJV_A	0	2005m5	369868.00	10623759.90	48.7608	18035059.57		10623759.90		0	10623759.9	7411299.677	28.7231	41.0938	0	1
NJV_A	0	2005m6	356391.00	10236658.52	54.3858	19382609.65		10236658.52		0	10236658.52	9145951.128	28.7231	47.1864	0	1
NJV_A	0	2005m7	360879.00	10365567.85	58.7619	21205935.71		10365567.85		0	10365567.85	10840367.86	28.7231	51.1195	0	1

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
NJV_A	0	2005m8	365443.00	10496660.13	65.3707	23889264.72		10496660.13		0	10496660.13	13392604.59	28.7231	56.0612	0	1
NJV_A	0	2005m9	389225.00	11179753.17	63.8832	24864938.52		11179753.17		0	11179753.17	13685185.35	28.7231	55.0381	0	1
NJV_A	0	2005m10	395570.00	11362001.32	60.87			11362001.32		0	11362001.32		28.7231		0	1
NJV_A	0	2005m11	369520.00	10613764.25	55.1381	20374630.71		10613764.25		0	10613764.25	9760866.458	28.7231	47.907	0	1
NJV_A	0	2005m12	363415.00	10438409.66	58.3034	21188330.11		10438409.66		0	10438409.66	10749920.45	28.7231	50.7351	0	1
NJV_A	0	2006m1	363131.00	12484467.44	63.4921	23055949.77		12484467.44		0	12484467.44	10571482.33	34.3801	45.8514	0	1
NJV_A	0	2006m2	314990.00	10829376.72	60.2523	18978871.98		10829376.72		0	10829376.72	8149495.258	34.3801	42.9398	0	1
NJV_A	0	2006m3	355650.00	12227270.17	62.1603	22107310.70		12227270.17		0	12227270.17	9880040.527	34.3801	44.6913	0	1
NJV_A	0	2006m4	355650.00	12227270.17		0.00		12227270.17		0	12227270.17	-12227270.17	34.3801	#DIV/0!	0	1
NJV_A	0	2006m5	353523.00	12154143.77	70.0808	24775174.66		12154143.77		0	12154143.77	12621030.89	34.3801	50.9422	0	1
NJV_A	0	2006m6	353523.00	12154143.77		0.00		12154143.77		0	12154143.77	-12154143.77	34.3801	#DIV/0!	0	1
NJV_A	0	2006m7	350433.00	12047909.37	74.2877	26032861.57		12047909.37		0	12047909.37	13984952.21	34.3801	53.7204	0	1
NJV_A	0	2006m8	321794.00	11063298.68	69.6639	22417425.04		11063298.68		0	11063298.68	11354126.35	34.3801	50.6487	0	1
NJV_A	0	2006m9	0.00	0.00	63.1611	0.00		0.00		0	0	0				1
NJV_A	0	2006m10	0.00	0.00	58.4447	0.00		0.00		0	0	0				1
NJV_A	0	2006m11	0.00	0.00	60.4533	0.00		0.00		0	0	0				1
NJV_A	0	2006m12	331869.00	11409677.84	59.084	19608148.00		11409677.84		0	11409677.84	8198470.157	34.3801	41.8115	0	1
NJV_A	0	2007m1	334623.00	12592882.17	54.5782	18263121.02		12592882.17		0	12592882.17	5670238.851	37.633	31.0475	0	1
NJV_A	0	2007m2	295720.00	11128843.85	58.5746	17321680.71		11128843.85		0	11128843.85	6192836.865	37.633	35.7519	0	1
NJV_A	0	2007m3	326758.00	12296898.27	64.3595	21029981.50		12296898.27		0	12296898.27	8733083.227	37.633	41.5268	0	1
NJV_A	0	2007m4	305268.00	11488164.15	68.6	20941384.80		11488164.15		0	11488164.15	9453220.647	37.633	45.1413	0	1
NJV_A	0	2007m5	326025.00	12269313.25	68.88	22456602.00		12269313.25		0	12269313.25	10187288.75	37.633	45.3643	0	1

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
NJV_A	0	2007m6	326025.00	12269313.25	68.88	22456602.00		12269313.25		0	12269313.25	10187288.75	37.633	45.3643	0	1
NJV_A	0	2007m7	326025.00	12269313.25	68.88	22456602.00		12269313.25		0	12269313.25	10187288.75	37.633	45.3643	0	1
NJV_A	0	2007m8	326025.00	12269313.25	68.88	22456602.00		12269313.25		0	12269313.25	10187288.75	37.633	45.3643	0	1
NJV_A	0	2007m9	326025.00	12269313.25	68.88	22456602.00		12269313.25		0	12269313.25	10187288.75	37.633	45.3643	0	1
NJV_A	0	2007m10	326025.00	12269313.25	68.88	22456602.00		12269313.25		0	12269313.25	10187288.75	37.633	45.3643	0	1
NJV_A	0	2007m11	330000.00	12418904.60	68.88	22730400.00		12418904.60		0	12418904.6	10311495.4	37.633	45.3643	0	1
NJV_A	0	200m712	0.00	0.00	68.88	0.00		0.00		0	0	0				1
NJV_D	0	1999m1	6561.00	197444.93	11.32	74270.52	9000.00	206444.93	0.00	9000	206444.9267	-132174.4067	31.4655	-177.96	1.37174	0
NJV_D	0	1999m2	18939.00	569945.05	10.75	203594.25	37000.00	606945.05	0.00	37000	606945.0489	-403350.7989	32.0474	-198.12	1.95364	0
NJV_D	0	1999m3	21607.00	650235.11	12.86	277866.02	49000.00	699235.11	0.00	49000	699235.1059	-421369.0859	32.3615	-151.64	2.26778	0
NJV_D	0	1999m4	19998.00	601814.30	15.73	314568.54	58000.00	659814.30	0.00	58000	659814.3032	-345245.7632	32.994	-109.75	2.90029	0
NJV_D	0	1999m5	1304.00	39242.22	16.12	21020.48	4000.00	43242.22	0.00	4000	43242.21679	-22221.73679	33.1612	-105.71	3.06748	0
NJV_D	0	1999m6	20893.00	628748.19	16.24	339302.32	0.00	628748.19	0.00	0	628748.1866	-289445.8666	30.0937	-85.306	0	0
NJV_D	0	1999m7	20893.00	628748.19	18.75	391743.75	0.00	628748.19	0.00	0	628748.1866	-237004.4366	30.0937	-60.5	0	0
NJV_D	0	1999m8	20893.00	628748.19	20.21	422247.53	0.00	628748.19	0.00	0	628748.1866	-206500.6566	30.0937	-48.905	0	0
NJV_D	0	1999m9	20893.00	628748.19	22.37	467376.41	0.00	628748.19	0.00	0	628748.1866	-161371.7766	30.0937	-34.527	0	0
NJV_D	0	1999m10	20893.00	628748.19	22.19	463615.67	0.00	628748.19	0.00	0	628748.1866	-165132.5166	30.0937	-35.618	0	0
NJV_D	0	1999m11	20893.00	628748.19	24.22	506028.46	22000.00	650748.19	0.00	22000	650748.1866	-144719.7266	31.1467	-28.599	1.05298	0
NJV_D	0	1999m12	8858.00	266570.21	25.01	221538.58	65000.00	331570.21	0.00	65000	331570.2119	-110031.6319	37.4317	-49.667	7.338	0
NJV_D	0	2000m1	8320.00	142792.92	25.21	209747.20	0.00	142792.92	0.00	0	142792.9177	66954.28229	17.1626	31.9214	0	0
NJV_D	0	2000m2	5967.00	102409.30	27.15	162004.05	10000.00	112409.30	0.00	10000	112409.2957	49594.75433	18.8385	30.6133	1.67588	0
NJV_D	0	2000m3	3580.00	61442.14	27.49	98414.20	27000.00	88442.14	0.00	27000	88442.14488	9972.055121	24.7045	10.1327	7.5419	0

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
NJV_D	0	2000m4	11975.00	205522.26	23.45	280813.75	0.00	205522.26	0.00	0	205522.2584	75291.49164	17.1626	26.8119	0	0
NJV_D	0	2000m5	17245.00	295969.21	27.23	469581.35	0.00	295969.21	0.00	0	295969.2146	173612.1354	17.1626	36.9717	0	0
NJV_D	0	2000m6	14093.00	241872.67	29.62	417434.66	0.00	241872.67	0.00	0	241872.667	175561.993	17.1626	42.0574	0	0
NJV_D	0	2000m7	13696.00	235059.11	28.16	385679.36	0.00	235059.11	0.00	0	235059.1107	150620.2493	17.1626	39.0532	0	0
NJV_D	0	2000m8	14815.00	254264.07	29.41	435709.15	0.00	254264.07	0.00	0	254264.0716	181445.0784	17.1626	41.6436	0	0
NJV_D	0	2000m9	11605.00	199172.09	32.08	372288.40	0.00	199172.09	0.00	0	199172.0925	173116.3075	17.1626	46.5006	0	0
NJV_D	0	2000m10	19436.00	333572.49	31.4	610290.40	0.00	333572.49	0.00	0	333572.4938	276717.9062	17.1626	45.342	0	0
NJV_D	0	2000m11	17890.00	307039.10	32.33	578383.70	0.00	307039.10	0.00	0	307039.0983	271344.6017	17.1626	46.9143	0	0
NJV_D	0	2000m12	17881.00	306884.63	25.28	452031.68	0.00	306884.63	0.00	0	306884.6348	145147.0452	17.1626	32.1099	0	0
NJV_D	0	2001m1	8515.00	148372.73	25.95	220964.25	74000.00	222372.73	0.00	74000	222372.7301	-1408.480149	26.1154	-0.6374	8.69055	0
NJV_D	0	2001m2	9804.00	170833.38	27.24	267060.96	67000.00	237833.38	0.00	67000	237833.3818	29227.57816	24.2588	10.9442	6.83395	0
NJV_D	0	2001m3	9804.00	170833.38	25.02	245296.08	22000.00	192833.38	0.00	22000	192833.3818	52462.69816	19.6688	21.3875	2.24398	0
NJV_D	0	2001m4	13041.00	227237.67	25.66	334632.06	0.00	227237.67	0.00	0	227237.6716	107394.3884	17.4249	32.0933	0	0
NJV_D	0	2001m5	16276.00	283607.11	27.55	448403.80	0.00	283607.11	0.00	0	283607.1117	164796.6883	17.4249	36.7518	0	0
NJV_D	0	2001m6	15665.00	272960.52	26.97	422485.05	0.00	272960.52	0.00	0	272960.5188	149524.5312	17.4249	35.3917	0	0
NJV_D	0	2001m7	13390.00	233318.95	24.8	332072.00	74000.00	307318.95	0.00	74000	307318.9497	24753.0503	22.9514	7.45412	5.52651	0
NJV_D	0	2001m8	14867.00	259055.48	25.81	383717.27	22000.00	281055.48	0.00	22000	281055.4761	102661.7939	18.9047	26.7545	1.47979	0
NJV_D	0	2001m9	14508.00	252799.95	25.03	363135.24	0.00	252799.95	0.00	0	252799.9494	110335.2906	17.4249	30.3841	0	0
NJV_D	0	2001m10	15387.00	268116.41	20.73	318972.51	0.00	268116.41	0.00	0	268116.4062	50856.1038	17.4249	15.9437	0	0
NJV_D	0	2001m11	13788.00	240254.05	18.69	257697.72	67000.00	307254.05	0.00	67000	307254.0462	-49556.32619	22.2842	-19.23	4.8593	0
NJV_D	0	2001m12	13005.00	226610.38	18.52	240852.60	0.00	226610.38	0.00	0	226610.3765	14242.22354	17.4249	5.91325	0	0
NJV_D	0	2002m1	7296.00	148191.32	19.15	139718.40	28000.00	176191.32	0.00	28000	176191.3241	-36472.92408	24.149	-26.105	3.83772	0

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
NJV_D	0	2002m2	14811.00	300830.83	19.98	295923.78	0.00	300830.83	0.00	0	300830.8252	-4907.045232	20.3113	-1.6582	0	0
NJV_D	0	2002m3	15327.00	311311.46	23.64	362330.28	0.00	311311.46	0.00	0	311311.4616	51018.81836	20.3113	14.0807	0	0
NJV_D	0	2002m4	13894.00	282205.35	25.43	353324.42	0.00	282205.35	0.00	0	282205.3532	71119.06683	20.3113	20.1285	0	0
NJV_D	0	2002m5	15556.00	315962.75	25.69	399633.64	0.00	315962.75	0.00	0	315962.7518	83670.88817	20.3113	20.9369	0	0
NJV_D	0	2002m6	15035.00	305380.56	24.49	368207.15	0.00	305380.56	0.00	0	305380.5589	62826.59113	20.3113	17.0628	0	0
NJV_D	0	2002m6	14536.00	295245.21	25.75	374302.00	0.00	295245.21	0.00	0	295245.2147	79056.78526	20.3113	21.1211	0	0
NJV_D	0	2002m8	13810.00	280499.20	26.78	369831.80	0.00	280499.20	0.00	0	280499.2031	89332.59694	20.3113	24.1549	0	0
NJV_D	0	2002m9	9430.00	191535.66	28.28	266680.40	0.00	191535.66	0.00	0	191535.6615	75144.73854	20.3113	28.1778	0	0
NJV_D	0	2002m10	0.00	0.00	27.53	0.00	0.00	0.00	0.00	0	0	0				0
NJV_D	0	2002m11	1901.00	38611.80	24.79	47125.79	9000.00	47611.80	0.00	9000	47611.80196	-486.0119557	25.0457	-1.0313	4.73435	0
NJV_D	0	2002m12	17686.00	359225.84	27.89	493262.54	0.00	359225.84	0.00	0	359225.844	134036.696	20.3113	27.1735	0	0
NJV_D	0	2003m1	14863.00	438053.18	30.77	457334.51	0.00	438053.18	0.00	0	438053.1805	19281.32954	29.4727	4.21602	0	1
NJV_D	0	2003m2	12522.00	369057.52	32.88	411723.36	37000.00	406057.52	0.00	37000	406057.5204	5665.839596	32.4275	1.37613	2.9548	1
NJV_D	0	2003m3	12141.00	357828.41	30.36	368600.76	0.00	357828.41	0.00	0	357828.4104	10772.34958	29.4727	2.9225	0	1
NJV_D	0	2003m4	1881.00	55438.20	25.49	47946.69	10000.00	65438.20	0.00	10000	65438.20443	-17491.51443	34.7891	-36.481	5.31632	1
NJV_D	0	2003m5	0.00	0.00	26.06	0.00	0.00	0.00	0.00	0	0	0				1
NJV_D	0	2003m6	4907.00	144622.68	27.91	136954.37	27000.00	171622.68	0.00	27000	171622.6843	-34668.31429	34.9751	-25.314	5.50234	1
NJV_D	0	2003m7	4907.00	144622.68	28.59	140291.13	18000.00	162622.68	0.00	18000	162622.6843	-22331.55429	33.141	-15.918	3.66823	1
NJV_D	0	2003m8	4907.00	144622.68	29.68	145639.76	9000.00	153622.68	0.00	9000	153622.6843	-7982.924286	31.3068	-5.4813	1.83411	1
NJV_D	0	2003m9	4907.00	144622.68	26.88	131900.16	0.00	144622.68	0.00	0	144622.6843	-12722.52429	29.4727	-9.6456	0	1
NJV_D	0	2003m10	4907.00	144622.68	29.01	142352.07	0.00	144622.68	0.00	0	144622.6843	-2270.614286	29.4727	-1.5951	0	1
NJV_D	0	2003m11	4907.00	144622.68	29.12	142891.84	0.00	144622.68	0.00	0	144622.6843	-1730.844286	29.4727	-1.2113	0	1

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
NJV_D	0	2003m12	4907.00	144622.68	29.95	146964.65	0.00	144622.68	0.00	0	144622.6843	2341.965714	29.4727	1.59356	0	1
NJV_D	0	2004m1	4907.00	108685.00	31.4	154079.80	0.00	108685.00	0.00	0	108684.9952	45394.80475	22.149	29.4619	0	1
NJV_D	0	2004m2	4907.00	108685.00	31.32	153687.24	0.00	108685.00	0.00	0	108684.9952	45002.24475	22.149	29.2817	0	1
NJV_D	0	2004m3	4907.00	108685.00	33.67	165218.69	0.00	108685.00	0.00	0	108684.9952	56533.69475	22.149	34.2175	0	1
NJV_D	0	2004m4	4907.00	108685.00	33.71	165414.97	18000.00	126685.00	0.00	18000	126684.9952	38729.97475	25.8172	23.4138	3.66823	1
NJV_D	0	2004m5	2350.00	52050.08	37.63	88430.50	0.00	52050.08	0.00	0	52050.07924	36380.42076	22.149	41.1401	0	1
NJV_D	0	2004m6	0.00	0.00	35.54	0.00	20000.00	20000.00	0.00	20000	20000	-20000				1
NJV_D	0	2004m7	2468.00	54663.66	37.93	93611.24	0.00	54663.66	0.00	0	54663.65769	38947.58231	22.149	41.6057	0	1
NJV_D	0	2004m8	21848.00	483910.69	42.08	919363.84	0.00	483910.69	0.00	0	483910.6941	435453.1459	22.149	47.3646	0	1
NJV_D	0	2004m9	15521.00	343774.16	41.65	646449.65	19000.00	362774.16	0.00	19000	362774.1616	283675.4884	23.3731	43.8821	1.22415	1
NJV_D	0	2004m10	12636.00	279874.38	46.87	592249.32	0.00	279874.38	0.00	0	279874.3835	312374.9365	22.149	52.7438	0	1
NJV_D	0	2004m11	10646.00	235797.93	42.23	449580.58	18000.00	253797.93	0.00	18000	253797.9334	195782.6466	23.8397	43.5478	1.69078	1
NJV_D	0	2004m12	13406.00	296929.09	39.09	524040.54	36000.00	332929.09	0.00	36000	332929.0903	191111.4497	24.8343	36.4688	2.68536	1
NJV_D	0	2005m1	9806.00	338487.80	43.822	429718.53		338487.80		0	338487.803	91230.72904	34.5184	21.2303	0	1
NJV_D	0	2005m2	5007.00	172833.82	46.9836	235246.89		172833.82		0	172833.819	62413.06617	34.5184	26.5309	0	1
NJV_D	0	2005m3	15435.00	532792.09	53.2387	821739.33		532792.09		0	532792.0904	288947.2441	34.5184	35.1629	0	1
NJV_D	0	2005m4	15828.00	546357.84	52.1535	825485.60		546357.84		0	546357.8366	279127.7614	34.5184	33.8138	0	1
NJV_D	0	2005m5	15472.00	534069.27	48.7608	754427.10		534069.27		0	534069.2726	220357.825	34.5184	29.2086	0	1
NJV_D	0	2005m6	10446.00	360579.60	54.3858	568114.07		360579.60		0	360579.6033	207534.4635	34.5184	36.5304	0	1
NJV_D	0	2005m7	10705.00	369519.88	58.7619	629046.14		369519.88		0	369519.8787	259526.2608	34.5184	41.2571	0	1
NJV_D	0	2005m8	16298.00	562581.50	65.3707	1065411.67		562581.50		0	562581.5024	502830.1662	34.5184	47.1959	0	1
NJV_D	0	2005m9	16277.00	561856.62	63.8832	1039826.85		561856.62		0	561856.6152	477970.2312	34.5184	45.9663	0	1

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
NJV_D	0	2005m10	10558.00	364445.67	60.87			364445.67		0	364445.6683		34.5184		0	1
NJV_D	0	2005m11	16179.00	558473.81	55.1381	892079.32		558473.81		0	558473.8083	333605.5116	34.5184	37.3964	0	1
NJV_D	0	2005m12	10688.00	368933.07	58.3034	623146.74		368933.07		0	368933.0653	254213.6739	34.5184	40.7952	0	1
NJV_D	0	2006m1	10891.00	894318.18	63.4921	691492.46		894318.18	229000.00	229000	1123318.179	-202825.7181	82.1153	-29.332	21.0265	1
NJV_D	0	2006m2	10821.00	888570.11	60.2523	651990.14		888570.11	151000.00	151000	1039570.105	-236579.9671	82.1153	-36.286	13.9543	1
NJV_D	0	2006m3	5383.00	442026.88	62.1603	334608.89		442026.88	310000.00	310000	752026.8808	-107417.9859	82.1153	-32.103	57.5887	1
NJV_D	0	2006m4	0.00	0.00		0.00		0.00		0	0	0				1
NJV_D	0	2006m5	11136.00	914436.44	70.0808	780419.79		914436.44	172000.00	172000	1086436.438	-134016.649	82.1153	-17.172	15.4454	1
NJV_D	0	2006m6	0.00	0.00		0.00		0.00	297000.00	297000	297000	0				1
NJV_D	0	2006m7	10931.00	897602.79	74.2877	812038.85		897602.79		0	897602.7929	-85563.94418	82.1153	-10.537	0	1
NJV_D	0	2006m8	10931.00	897602.79	69.6639	761496.09		897602.79		0	897602.7929	-136106.702	82.1153	-17.874	0	1
NJV_D	0	2006m9	10931.00	897602.79	63.1611	690413.98		897602.79	182000.00	182000	1079602.793	-207188.8088	82.1153	-30.009	16.6499	1
NJV_D	0	2006m10	10931.00	897602.79	58.4447	638859.02		897602.79		0	897602.7929	-258743.7772	82.1153	-40.501	0	1
NJV_D	0	2006m11	10931.00	897602.79	60.4533	660815.02		897602.79		0	897602.7929	-236787.7706	82.1153	-35.833	0	1
NJV_D	0	2006m12	10931.00	897602.79	59.084	645847.20		897602.79		0	897602.7929	-251755.5889	82.1153	-38.981	0	1
NJV_D	0	2007m1	10931.00	987394.03	54.5782	596594.30		987394.03		0	987394.0347	-390799.7305	90.3297	-65.505	0	1
NJV_D	0	2007m2	10931.00	987394.03	58.5746	640278.95		987394.03		0	987394.0347	-347115.0821	90.3297	-54.213	0	1
NJV_D	0	2007m3	10931.00	987394.03	64.3595	703513.69		987394.03		0	987394.0347	-283880.3402	90.3297	-40.352	0	1
NJV_D	0	2007m4	10931.00	987394.03	68.6	749866.60		987394.03		0	987394.0347	-237527.4347	90.3297	-31.676	0	1
NJV_D	0	2007m5	10931.00	987394.03	68.88	752927.28		987394.03		0	987394.0347	-234466.7547	90.3297	-31.141	0	1
NJV_D	0	2007m6	10931.00	987394.03	68.88	752927.28		987394.03		0	987394.0347	-234466.7547	90.3297	-31.141	0	1
NJV_D	0	2007m7	10931.00	987394.03	68.88	752927.28		987394.03	182000.00	182000	1169394.035	-234466.7547	90.3297	-31.141	16.6499	1

COMPANY CODE	OWNERSHIP (DUMMY)	TIME	OUTPUT (BBL)	OPEX ($)	OILPRICE ($)	OILREV ($)	ROYALTY ($)	PXNCOST ($)	PPT ($)	GT ($)	TOTALCOST ($)	GROSSPROFIT ($)	COSTBBL ($)	GROSSMARGIN ($)	GTBBL ($)	AF (DUMMY)
NJV_D	0	2007m8	10931.00	987394.03	68.88	752927.28		987394.03		0	987394.0347	-234466.7547	90.3297	-31.141	0	1
NJV_D	0	2007m9	10931.00	987394.03	68.88	752927.28		987394.03		0	987394.0347	-234466.7547	90.3297	-31.141	0	1
NJV_D	0	2007m10	10931.00	987394.03	68.88	752927.28		987394.03		0	987394.0347	-234466.7547	90.3297	-31.141	0	1
NJV_D	0	2007m11	10931.00	987394.03	68.88	752927.28		987394.03		0	987394.0347	-234466.7547	90.3297	-31.141	0	1
NJV_D	0	200m712	10931.00	987394.03	68.88	752927.28		987394.03		0	987394.0347	-234466.7547	90.3297	-31.141	0	1

Appendix 125: Data on Drilling Activities

Code	Year	Expl Wells	Dev Wells	Totalwells
2_SH_JV	1999	1	26	27
2_SH_JV	2000	1	18	19
2_SH_JV	2001	0	0	0
2_SH_JV	2002	6	48	54
2_SH_JV	2003	2	26	28
2_SH_JV	2004	1	11	12
2_SH_JV	2005	1	18	19
2_SH_JV	2006	2	6	8

2_SH_JV	2007	2	15	17
3_MOB_JV	1999	1	24	25
3_MOB_JV	2000	0	22	22
3_MOB_JV	2001	0	0	0
3_MOB_JV	2002	9	49	58
3_MOB_JV	2003	0	22	22
3_MOB_JV	2004	0	19	19
3_MOB_JV	2005	0	21	21
3_MOB_JV	2006	0	24	24
3_MOB_JV	2007	3	39	42

4_CHV_JV	1999	0	12	12
4_CHV_JV	2000	1	26	27
4_CHV_JV	2001	0	0	0
4_CHV_JV	2002	4	42	46
4_CHV_JV	2003	2	22	24
4_CHV_JV	2004	0	23	23
4_CHV_JV	2005	0	20	20
4_CHV_JV	2006	2	20	22
4_CHV_JV	2007	2	22	24
5_ELF_JV	1999	1	12	13

5_ELF_JV	2000	0	9	9
5_ELF_JV	2001	0	0	0
5_ELF_JV	2002	0	3	3
5_ELF_JV	2003	0	18	18
5_ELF_JV	2004	0	17	17
5_ELF_JV	2005	0	6	6
5_ELF_JV	2006	3	16	19
5_ELF_JV	2007	1	9	10
10_NA_JV	1999	1	0	1
10_NA_JV	2000	2	12	14

10_NA_JV	2001	0	0	0
10_NA_JV	2002	1	0	1
10_NA_JV	2003	0	0	0
10_NA_JV	2004	0	0	0
10_NA_JV	2005	0	0	0
10_NA_JV	2006	0	2	2
10_NA_JV	2007	0	0	0

International Journal of Energy and Statistics
Vol. 0, No. 0 (0000) 000–000

Government ownership and cost efficiency of upstream oil and gas companies in Nigeria

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Received (25 September 2014)
Revised (05 November 2014)
Accepted (08 November 2014)
Published (31 December 2014)

The Government of Nigeria holds 60% in upstream oil and gas JVCs which operate alongside non-JVCs. Using a multivariate regression analysis based on a monthly panel dataset (1999 – 2007), we examined cost efficiency of both JVCs and non-JVCs with the aim of determining whether or not Government ownership in the JVCs has any significant and systematic effect on their cost efficiency. Findings of the study indicate that non-JVCs spend twice as much as the JVCs to produce a barrel of oil. Findings are in line with the assumption that agent performs differently based on his ownership right on asset and the level of control of principal over him; as such right/control influences agent's actions ex-ante. Therefore, findings of the study indicate that Government ownership in the upstream oil and gas companies mitigates the potentials for adverse selection and moral hazard issues that characterized the upstream oil and gas sector. Overall, findings indicate that Government ownership has a significant impact on cost efficiency of the upstream oil and gas companies operating in Nigeria. Hence, continued Government participation in upstream operations in Nigeria is considered to be the most important policy implication of our findings.

Keywords: Government ownership; cost efficiency; upstream oil and gas companies.

Nomenclature

JVCs	Joint venture companies.
Non-JVCs	Non JVCs.
States	Oil rich nations.
IOCs	International oil companies.
PSCs	Production-sharing contracts.
SCs	Service contracts.
NNPC ASB	Nigeria national petroleum corporation annual statistical bulletin.
OUTPUT	Volume of crude oil produced.
OPEX	Operating expenditure.
ROYALTY	Royalty payment.
NEITI	Nigeria extractive industries transparency initiative.
Mcf	Thousand standard cubic feet.
i	Company.
OLS	Ordinary least squares.
FEM	Fixed-effects model.
REM	Random-effects model.
y_{it}	Cost efficiency.
α	Intercept term.
β	$k \times 1$ vector of parameters estimated on the explanatory variables.
x_{it}	$1 \times k$ vector of observations on the explanatory variables across companies over time.
u_{it}	Disturbance term across companies over time.
μ_i	Company specific effect.
v_{it}	Disturbance across companies over time.
υ_{it}	Idiosyncratic error term across companies over time.
LSDV	Least squares dummy variable.
$D1_i$	Ownership type 1 for JVCs and zero otherwise.
LM	Lagrange multiplier.
$lcostbbl_{it}$	Log of cost efficiency across companies over time.
$loutput_{it}$	Log of quantity of crude oil produced across companies over time.
$lopex_{it}$	Log of operating expenditure across companies over time.
$lroyalty_{it}$	Log of royalty payment across companies over time.

1. Introduction

Upstream activities require intensive capital investment. On one hand, the oil-rich nations are endowed with huge oil reserves but lack the capacity to explore for and exploit their oil reserves, on the other hand the IOCs who have the required funds and expertise are willing to invest their funds for good returns [1]. Therefore, the IOCs and the states pool their resources together in order to explore for, and exploit oil in the most effective and efficient routine. However, the uncertainties surrounding the discovery of oil, despite the intensive capital investment, constitutes the major source of risks in upstream operations [2]. These risks may be geological, prospect, political, regulatory, or commercial [3].

Consequently, for the IOCs to take-up such risks that may or may not result in oil discovery, they need to be motivated by the states via an effective incentive-system

[1]. Therefore, the joint venture operation that accords the IOCs title to oil resources is considered to be a high-powered incentive system. Under this operation, the IOCs operate the ventures due to their technical capability. On the other hand, Government enters into contractual agreement with other IOCs (production-sharing contract for example) to explore for oil at their own risk. This normally results in moral hazard and adverse-selection problems with the discovery of oil reserves [4]. It is however argued that these problems arise because the value of assets (oil reserves) in upstream operations are not contractible; hence, whoever owns the assets receives its value [5]. To understand these issues, agency theory is adopted.

Agency theory can be applied in analyzing contract relationships between firms or joint operations among firms [4, 5]. Hence, the theory is useful in analyzing the performance of upstream oil and gas companies operating in Nigeria that have different ownership status and operate under different petroleum fiscal regimes.

The remainder of this paper is structured into five sections as follows. Section 2 reviews literature on petroleum fiscal regimes, the theoretical framework underpinning the paper and prior studies on the effect of government control on the performance of upstream oil and gas companies. Section 3 discusses the dataset and the methodology employed. Section 4 presents the results and discussion on findings. Finally, Section 5 concludes the paper.

2. Literature Review

2.1. *Concessionary agreement*

The traditional concessionary agreement in oil exploration is considered the first generation of petroleum fiscal system. Concessionary agreement is a contractual arrangement in which a host country gives prospecting and exploration rights to a foreign oil company in return for a consideration to the host country in the form of royalty [6].

Some of the basic features of a concessionary system include the following: Firstly, development rights granted to the IOCs cover a vast area or even the entire country; secondly, contracts are for a long period; lastly, and perhaps the most important is that, the IOCs have absolute control over their operations. Hence, it is argued that the IOCs may manipulate their operations to their own advantage. For example, productions may be lowered when oil prices are low [1], this manipulation reduces the oil revenue accruable to the states. Consequently, the modern concessionary systems are being structured to provide for a shorter contract period, work obligation for the IOCs, relinquishment clause at the expiration of agreed period, higher royalties, and option for state participation - joint venture concession [3].

Although the concessionary agreement was the first type of petroleum fiscal system in Nigeria (as in the case of German Bitumen Company, and Shell D'Arcy Petroleum Company in 1908 and 1937 respectively [7]), the concessionary system no longer exists in Nigeria. At present there are five types of petroleum fiscal regimes in Nigeria, these include JVCs, PSC, SC. Moreover, there is a sole risk operation, where the upstream oil and gas companies are independent and do not involve in any of the aforementioned fiscal arrangements. Lastly, there is what is commonly known as marginal field operation, where the indigenous upstream oil and gas companies take over the oil fields that have been 'abandoned' by the IOC. A discussion on the first three fiscal systems is provided below.

2.2. *Joint Venture Companies*

JVCs emerged when oil-rich nations wanted to reclaim control of their oil resources; as against the previous status under the concession agreements where they simply receive royalties and taxes from the IOCs [8]. This paradigm shift in the 1970s changed the status of oil-rich nations from 'landlords to entrepreneurs' [9]. More so, membership of OPEC is considered to be the major momentum towards such paradigm shift [6]. For example, OPEC demanded its members to modify the traditional concessionary agreements in order to participate in the exploration and exploitation of their oil resources; the OPEC policy statement provided that Governments of oil producing countries shall under the principle of changing circumstances acquire a reasonable participation in existing contractual agreements if such are not provided. Where such have been provided but not implemented by the operators, the provided rate shall be the minimum basis of participation [6].

Under the JVCs, both the IOCs and the oil-rich nations (represented by their NOCs) participate in upstream operations. Production output and costs are shared on a pro-rata basis between the parties involved. Therefore, the oil-rich nations do not only receive royalties and taxes but also share in the equity oil. Similarly, the IOCs share with the oil-rich nations costs of production via a funding agreement [2].

2.3. *Production-sharing contract*

As mentioned above, the traditional concessionary agreement of petroleum exploration was considered exploitative [8]. Hence, increased criticisms on the exploitative nature of the old concessionary system on one hand and the perennial funding problems associated with the operations of the JVCs on the other hand paved way for the introduction of PSC [1, 4, and 10]. Indeed, the introduction of PSC in Nigeria was informed by the aforementioned perennial funding problems under the JVCs [11-13]. PSC is a contractual regime in which an oil company solely undertakes to explore and produce oil with a provision for a predetermined cost recovery (cost oil) from the oil produced in any one year. The remaining oil which is termed as profit oil is then shared between the host country and the oil company based on an agreed percentage; for instance, 55% to the government and the balance to the oil company [6].

The first PSC was introduced in Indonesia in the 1960s modeled after the agricultural crop sharing contract [10]. One fundamental difference between the PSC and the concessionary system is that, while ownership of petroleum resources rests with the IOCs under the concessionary system, ownership of petroleum resources rests with the states under the PSCs [4]. Another difference between the PSC and the JVC is that while states must fund JV operation based on their percentage of ownership, under the PSC states are not obliged for any financial commitment. Hence, the IOCs must bare all the risks associated with the exploration activities.

In a nutshell, PSC shields the states from the exploration risk; because the IOCs solely bear the risk of investment in the exploration activities [1]. That notwithstanding, states being the owners of the asset (oil reserves) not only share in the reward of oil discovered but also own the facilities emplaced by the contractors [3]. Even though the IOCs recover their cost of investment before production and/or profit is shared with the states, moral-hazard and adverse selection problems normally characterize the relationship between the states and the IOCs [4].

For example, some of the vital aspects of PSC that cause problems between states and the IOCs include title to crude oil [14], work programs and expenditures [3]. It is argued that although a national oil company has the right to make suggestions and propose revisions to any work plan and budget for the IOC, the IOC has the authority, by virtue of the contractual terms to make the final decisions on the matters concerning the operations [3].

Discussion on the PSC indicates that problems mainly arise due to risk-averse attitude of the states in the contractual relationship. Conversely, under the SC states may carry all the risks involved (if it is a non-risk service contract) or share some of the exploration risks with the IOCs (if it is a risk service contract) an issue discussed hereunder.

2.4. *Service contract*

Unlike the PSC, under SC the IOCs provide services in petroleum exploration activities that are of two categories. These are risk-service and non-risk service contracts. In the risk-service, the IOCs bear the financial risks involved in exploration activities for a fixed fee. However, if the IOCs are paid a flat fee based on the services rendered only without bearing the financial risks involved then the contract is called a non-risk service contract [2]. Although the SC is similar to the PSC because the IOCs do not possess ownership of oil reserves, SC differs from the PSC from the perspectives of remunerations, control over operations, and bearing of exploration risks [1].

In summary, the three distinguishing features of these petroleum fiscal regimes are attitude toward risk-taking, incentive-system, and performance-reward relationship. Under the JVCs risks are shared between the NOC and the IOCs. Hence, costs of production as well as production output are shared on a pro-rata basis. It can be argued that JV operation combines both risk-sharing and high-powered incentive system that motivates the IOCs to be more efficient. On the other hand, the PSCs may be less efficient because the IOCs under the PSCs bear all the risks associated with oil exploration activities and do not share in the asset ownership. Accordingly, agency theory is adopted in order to understand the extent to which the IOCs are motivated to be more efficient in their operations. Discussion on agency theory is provided below.

2.5. *Agency theory*

This section discusses agency theory, especially the effect of separation of ownership and control on the performance of companies [15, 16]. Agency theory focuses on the relationship between principals and agents and the costs of resolving conflicts of interest between principals and agents. Some of the basic assumptions upon which the theory is founded include the following. Firstly, agents are assumed to be risk-averse and are driven by self-interest [17]. Therefore, agents opt for short-term investments that guarantee them their rewards [18]. On the other hand, the principals prefer for long-term investments that do not only provide them with a steady flow of income, but also the appreciation of their asset in the long-run [19]. Similarly, principal can adopt some control mechanisms in order to monitor the activities of agent and measure its performance [20].

However, it is argued that the performance measures used in agency relationship may not capture the 'real' effort of agents in establishing the relationship between input and output [21]; hence the problem of moral hazard and adverse selection on the side of the agent [19, 20]. Overall, agency problems arise mainly because of the risk-averse attitude of agents and principals which emerge due to divergent goals of both the principals and agents [22]. In what follows, agency problems are discussed.

2.6. *Agency problem*

Principals appoint agents to manage their resources; this brings about the fragmentation of ownership and control [19]. While agents are expected to run the businesses in a way that will maximize the principals' wealth; it is, however, argued that agents may pursue some goals that will enable them maximize their wealth rather than that of the principals' [22]. Similarly, while agents have first-hand information as a result of managing the business on a day to day basis, principals get information periodically which may be maneuvered by the agents [23].

When the aforementioned complications are taken into consideration, it can be deduced that agents are in a position to maximize their own wealth without necessarily being detected by the principals. In summary, agency problem arises when agents make decisions that are contrary to that of principals' wealth maximization. Furthermore, it is important to state that the principal-agent conflict is more prevalent in the state-owned companies than what is experienced in the privately-owned companies [24].

2.7. *Control mechanisms in agency relationship*

Agency theory literature indicates that agency problems can be mitigated by either including some clauses in the contract that formalize punishment and reward [17, 23] or by adopting effective monitoring mechanisms [20]. However, the inclusion of such clauses in contracts seems easier than adopting monitoring mechanisms which proved to be difficult and costly [18]. That notwithstanding, an optimal incentive-system linked to performance of the agent may be more effective in addressing these problems.

The performance-related incentive system aims at mitigating moral hazards and adverse selection problems which ultimately motivates the agents to maximize the principals' wealth. However, it was argued whether the performance-related incentive-system works in addressing the agency problems [21]. One of the problems in the performance-related incentive-system is the difficulty to establish a correlation between the agent's efforts and the business' performance because of the possibility that the performance indicators of the business may be maneuvered by the agent who has the advantage of information asymmetry.

While the proponents of agency theory believe that it can be used in addressing agency problems, others argued that the highly simplified assumptions portrayed by agency theorists alongside very complex models required to address such assumptions are not only difficult but unattainable in most cases [25-29]. Also, the inability of the theory to address the performance measurement issues adds to its limitations [21].

2.8. *Agency relationship in upstream oil and gas operations*

First of all, issues of separation of ownership and control [17] and risk-averse attitude of agent and principal [30] as explained by the classical model of agency theory are analyzed in the context of upstream operation. In upstream operation, for example, the state (principal) engages an IOC (agent) in a JVC, PSC or SC.

Under the JV operation, the IOC and the state engage in a joint operation with the state having the largest ownership in the venture while the IOC is serving as the operator of the venture. Hence, costs of operations as well as the outputs are shared between the state and the IOC on a pro rata basis. Although the IOC's inputs (operator's share of costs) are being monitored, due to the problem of information asymmetry the state cannot confirm whether the inputs of the IOC are the best chosen for a particular combination of outputs; the output may be either oil, gas, or a combination of both. It is argued that, the information asymmetry issue in such an agency relationship results in an adverse selection problem [4].

On the other hand, the state shields itself from the risks associated with the exploration activities; thereby allowing the IOC to recover its investment only if oil is discovered. Consequently, the IOC's action ex-ante (investment decisions taken) is rewarded based on the performance of the IOC ex-post which is associated with a number of risks and uncertainties the IOC has to overcome [5]. Hence, if the IOC is risk-averse, it will make investment that provides optimal trade-off between risk-taken and expected reward provided under the PSC [1]. Thus, a reward system based on measured performance, which may not capture the specific relationship between IOC's inputs and outputs, may warrant the IOC to manipulate their input (cost oil); thereby resulting in the problem of moral hazard [4]. Therefore, it can be argued that the IOC, being the sole operator of the venture in the PSC, may engage in sub-optimal behaviors (adverse selection and moral hazard) that may enhance its performance.

From the foregoing, it can be deduced that the IOC decides on the course of action to be taken in order to maximize output from the resources of the state. As ownership of oil reserves plays a vital role in determining pay-off to the parties involved in either a JVC or a non-JVC, it can be argued that asset ownership is one of the agency problems that characterize upstream operations. Consequently, where the agent is accorded with the right to own part of the asset in question, such ownership facilitates principal-agent contractual relationship [31]. That is, if an agent does not own the asset being used in the contract, the agent's incentive comes only from the measured performance. However, if the agent owns the asset, the agent's incentive is not only based on the measured performance but also on the residual value of the asset [5].

In a nutshell, agent performs differently based on its ownership right on asset. Consequently, considering the assumption that agent's ownership right on asset influences the agent's actions ex-ante the state can structure an optimal incentive-system in a way that will mitigate the potentials for adverse selection and moral hazard problems in either of the petroleum fiscal regimes. Incentive design is discussed hereunder.

2.9. *Incentive-system in agency relationship*

The need to design an optimal incentive system stems from the need to align the goals of the principal and that of the agent which mitigates the moral-hazard problems and ultimately results in efficient performance by the agent. As argued, the moral-hazard model of incentive design is one of the major tools used to understand performance-measurement systems and the provision of incentives [32].

Following Sappington's modeling of incentive-system, we now have the following assumptions on principal-agent relationship [33]. Principal may be accorded with the power to make a 'take-it-or-leave-it' contract offer to an agent. However, the agent may only accept the offer if the agent's expectations (expected pay-off) are met or even exceeded. Therefore, there may be two possible outcomes in this contracting relationship as applied in the upstream operations.

The first scenario is the situation whereby the agent, working alongside the principal, uses the most efficient input for production; which in turn results in an increased surplus to both parties. This scenario is possible where the principal is not risk-averse (as in JVCs) and the agent is motivated by having a share on the residual value of the asset. Consequently, agent's interest is aligned with that of the principal. The second scenario is where the principal is risk-averse (as in non-JVCs) and the agent does not share the residual value of the asset. Consequently, there may be some frictions in the principal-agent relationship.

Consequently, JVCs whose rewards are based on both measured performance and the residual value of the asset may be more efficient than the non-JVCs whose rewards are based on measured performance that in turn depends on 'cost oil'. More so, the closer cost monitoring under the JV operation, because the state is a partner in the operation, means that the JVCs may be more efficient than the non-JVCs who solely operate and may manipulate their costs. In view of the forgoing assumptions, we now have the following:

Hypothesis: Joint venture companies (JVCs) are more cost efficient than non-joint venture companies (non-JVCs).

Discussion so far provides details on how an agency relationship between principal and agent can be managed effectively via an optimal incentive-system. However, where there seems to be some frictions in the agency relationship between principal and agent, the need for finding a solution cannot be overemphasized. For example, where there is an information asymmetry, the principal opts for adopting some control mechanisms in order to checkmate the problems of moral-hazard and sub-optimal behaviors on the side of the agent.

In the same line of reasoning of agency theory, one of the major reasons for government participation in upstream operations can be attributed to such frictions in the agency relationship between the oil-rich nations and the IOCs. One major issue causing such frictions can be attributed to lack of goal congruence between the oil-rich nations and the IOCs [1]. This problem is highly associated with the kind of ownership of companies.

The relationship between ownership structure of companies and their performance is a well-researched area; see for example [15]. However, discussion in the literature focuses generally on the effect of ownership structure on privately owned companies [15]. Nonetheless, because the upstream oil and gas companies are not only private, but can be partially owned by states or even wholly owned by states, then the need for analyzing the performance of the upstream oil and gas companies in their distinctive way becomes necessary; hence the importance of this paper. Performance of upstream oil and gas companies can be affected by a number of factors [34-38]. These factors can be company-specific [35], country specific [36], and market specific [37] or based on the type of petroleum fiscal regimes obtained in a particular country [38].

3. Methods

3.1. *Population*

Companies involved in the upstream operation in Nigeria constitute the population of this study, and these companies include both IOCs and indigenous oil companies. Based on the NNPC ASB, there are 31 upstream oil and gas companies that are engaged in the exploration and production of crude oil in Nigeria [39]. These companies are involved in different upstream operations ranging from the JVCs, PSC, SC, independent operators and marginal field operators. Hence, the upstream oil and gas companies that engaged in the exploration and production activities during the period 1999 - 2007 formed population of the study.

3.2. *Sample*

Obtaining complete data on all the upstream oil and gas companies operating in Nigeria was not feasible; thus, the need for sampling from the population. In this regard, a convenience sampling method was adopted based on the availability of data from some of the upstream oil and gas companies. Hence, the upstream oil and gas companies that operated during the period (1999 – 2007) and have complete data needed for this analysis formed the sample.

The sample comprises of 5 JVCs and 4 non-JVCs, i.e. 9 companies out of 31 companies, making the sample 29% of the total population. It is important to note here that this sample (29%) accounts for more than 85% of the total crude oil production. Therefore, our sample covers 85% of the upstream operations in Nigeria.

3.3. *Data*

Our dataset includes the following variables: OUTPUT, OPEX, and ROYALTY. The sources of our data are NNPC ASB and NEITI audit reports. Data on crude oil production were obtained from the NNPC ASB 1999-2007 [39]; ROYALTY and OPEX were obtained from NEITI audit reports for the period 1999 – 2007 [40].

Data on upstream operation are generally lacking in Nigeria. For example, data on crude oil production are only available (at public domain) for the period 1997 – 2013. Similarly, data on royalty are only available for the period 1999 – 2011 [41]. However, data on OPEX (an important variable in this analysis) are lacking and the only data available (at the public domain) are for the period 1999-2007 [40-42]. Hence the selection of the period (1999-2007) because of the availability of data needed for this analysis.

Although data on OUTPUT and ROYALTY are available on a monthly-basis, data on OPEX are on annual-basis. Consequently, the OPEX annual data were converted to a monthly data based on output (crude oil and natural gas). In order to apportion the OPEX data appropriately, the natural gas produced was converted to oil equivalent based on a general approximation that one barrel of oil contains six times as much energy as does one thousand cubic feet (mcf) of gas [43].

3.4. *Model specification*

This study employs a multivariate regression analysis based on a panel dataset. Panel data regression technique allows for multiple companies to be observed at two or more periods. Hence, the cross-sectional information resonated in the differences between companies and the time-series information reflected in the changes within companies over time provides us with rich data relating to the companies. Moreover, the problem of multi-collinearity is highly mitigated due to variability of the data, while controlling for individual heterogeneity [44, 45]. Following Brooks' modeling [45], the panel regression model used by this paper is in the form of:

$$y_{it} = \alpha + \beta x_{it} + u_{it}. \quad (1)$$

The independent variables are all captured by x_{it}. Individual effect is α that is taken as constant over time (t) and is specific to each company (i); where α is considered to be uniform across all the companies, the OLS provides an efficient estimate of α and β [44]. However, if heterogeneity exists across companies, the OLS will lead to a heterogeneity bias because the differences across companies have not been captured by the OLS. Hence, the two approaches that are normally applied in addressing the issue of heterogeneity bias are: (i) FEM and, (ii) REM.

Under the fixed-effect approach, α is taken to be a company specific constant term. Therefore, by decomposing the u, into a company specific effect, μ_i and the remainder as disturbance υ_{it} (idiosyncratic error term), that varies over time and across companies capturing everything that is left unexplained about y_{it} [45]. Hence, the Equation (2) below:

$$u_{it} = \mu_i + \upsilon_{it}. \tag{2}$$

Now we can re-write Equation (1) as follows:

$$y_{it} = \alpha + \beta\, x_{it} + \mu_i + \upsilon_{it}. \tag{3}$$

Let us now consider the company heterogeneity μ_i (ownership type) that affects y_{it} (cost efficiency) across companies but does not vary over time. For example, while the alternate hypothesis states that cost efficiency varies across companies and over-time, the ownership type remains fixed over time. Therefore, our model can be estimated using the LSDV approach as follows:

$$y_{it} = \beta\, x_{it} + \mu_1 D1_i + \mu_2 D2_i + \mu_3 D3_i + \ldots + \mu_N DN_i + \upsilon_{it}. \tag{4}$$

The LSDV set out in Equation (4) above includes a company-specific dummy variable D_i that changes the intercept α for each company. Thus, the effect of government ownership on cost efficiency can be determined using this model that captures ownership type of companies. In a nutshell, the LSDV provides unbiased coefficients β because the companies' differences are correlated with the independent variables. On the other hand, if the companies' differences are not correlated with the independent variables, then we can assume that the companies' differences are accounted for randomly. Hence, the need for using REM, as specified in Equation (5) below:

$$y_{it} = \alpha + \beta\, x_{it} + \omega_{it}, \quad \omega_{it} = \varepsilon_i + \upsilon_{it}. \tag{5}$$

The REM considers α being a group specific disturbance that is captured by random error term ε_i, which is independent of the individual observation error term υ_{it} and the independent variables x_{it}. Although the REM makes some strong assumptions, its robustness cannot be overemphasized as it is 'theoretically superior' to FEM [36].

In order to determine which of the above models are more appropriate to be used, we conducted a Hausman test for fixed-effect vs. random effects. The null hypothesis is that random effect model is better. The test results (chi^2 value = 25.53 and p-value = 0.0000) indicate that we can reject the null hypothesis and use the FEM. Similarly, a Breusch-Pagan LM test for random effects was conducted with the null hypothesis that the OLS is better. The test results (chi^2 value = 47.02 and p-value = 0.0000) indicate that we can reject the null hypothesis and use the REM. However, since the Hausman test indicates that FEM is better than the REM, the FEM is adopted. The FEM adopted is in the form of:

$$lostbbl_{it} = \alpha + \beta_1 loutput_{it} + \beta_2 lopex_{it} + \beta_3 lroyalty_{it} + \varepsilon_i + \upsilon \qquad (6)$$

where, $lcostbbl_{it}$ is a proxy for cost efficiency, α and β s are vectors of parameters in the cases of $\beta_1, \beta_2, \beta_3$ *and* β_4, ε_i captures company-specific disturbance but does not vary over time, $i = 1, \ldots, N$; $t = 1, \ldots, T_i$.

4. Results and Discussion on Findings

This study investigates the effect of government ownership on production efficiency of the upstream oil and gas JVCs operating in Nigeria alongside the non-JVCs. The ownership type takes the value 1 if the company is a JVC and the value 0 for non-JVCs. Ownership is interacted with the independent variables so as to see its effect on such variables. Find below the model estimated.

$$\begin{aligned} lcostbbl_{it} = \alpha + \beta_1 loutput_{it} + \beta_2 lopex_{it} + \beta_3 lroyalty_{it} + \beta_4 own\_loutput_{it} \\ + \beta_5 own\_lopex_{it} + \beta_6 own\_lroyalty_{it} + \varepsilon_i \\ + \vartheta \end{aligned} \qquad (7)$$

Table 1 below provides us with interesting results on the parameters used in our model, below is a discussion on the overall, between and within variations. Overall variation is the variation over time and between the companies involved, that is both the JVCs and the non-JVCs. However, it is important to state that the aim of this analysis is not only about the overall mean and the standard deviation for the overall variation over time and between companies, but also to break it down to the level of between and within variation. Between variation is the variation between the companies involved. Here, the variation accounts for changes in our parameters between companies, taking into consideration the companies distinctive characteristics but does not focus on how it changes over time. On the other hand, within variation is the variation within the companies involved over time; that is how the respective parameters change over time.

We now consider the variations (both between and within) for each of the parameters used in our model so as to understand how they vary between and within companies. The time-invariant regressor id (ownership) in our model does not vary over time, therefore we can see that the within variation is zero. On the other hand, the individual-invariant regressor (month) does not vary between individual companies; therefore it has a 0 between variation because it does not vary with the ownership type of the companies.

On the dependent variable in our model, costbbl, we have less between variations (10.29532) than within variation (88.97887). This indicates that ownership type is instrumental on the performance of the companies; therefore the need to control for it in our model. Similarly, we can see that all the regressors in our model have more within variation than between variation.

Additionally, we can see a huge difference between the minimum and the maximum cost per barrel of oil produced. The overall minimum cost per barrel is zero and the maximum is 1993.01.

Table 1. Descriptive statistics: Overall, between and within variations.

Variable		Mean	Std. Dev.	Min	Max	Observations	
Id	Overall	5	2.583318	1	9	N =	972
	Between		2.738613	1	9	n =	9
	Within		0	5	5	T =	108
Month	Overall	521.5	31.19163	468	575	N =	972
	Between		0	521.5	521.5	n =	9
	Within		31.19163	468	575	T =	108
Costbbl	Overall	18.44764	89.50728	0	1993.01	N =	972
	Between		10.29532	6.142942	36.87675	n =	9
	Within		88.97887	-18.4291	1988.908	T =	108
Output	Overall	7122288	1.31E+07	0	3.23E+08	N =	972
	Between		8532307	11281.55	2.22E+07	n =	9
	Within		1.04E+07	-1.50E+07	3.11E+08	T =	108
Opex	Overall	2.00E+07	2.80E+07	0	6.17E+08	N =	972
	Between		1.90E+07	411350.4	5.48E+07	n =	9
	Within		2.15E+07	-3.49E+07	5.98E+08	T =	108
Royalty	Overall	1.45E+07	2.02E+07	0	9.83E+07	N =	972
	Between		1.41E+07	0	3.88E+07	n =	9
	Within		1.52E+07	-2.43E+07	7.40E+07	T =	108

Own_output	Overall	6931084	1.32E+07	0	3.23E+08	N =	972
	Between		8699029	0	2.22E+07	n =	9
	Within		1.04E+07	-1.52E+07	3.11E+08	T =	108
Own_opex	Overall	1.75E+07	2.91E+07	0	6.17E+08	N =	972
	Between		2.11E+07	0	5.48E+07	n =	9
	Within		2.12E+07	-3.73E+07	5.96E+08	T =	108
Own_royalty	Overall	1.35E+07	2.06E+07	0	9.83E+07	N =	972
	Between		1.50E+07	0	3.88E+07	n =	9
	Within		1.50E+07	-2.52E+07	7.31E+07	T =	108

Considering the between variation, the minimum cost per barrel is \$6.14294 and the maximum is \$36.87675. On the other hand, the within variation differs significantly, with a minimum of \$-18.42911 (this indicates a loss) and a maximum of \$1988.908. This clearly indicates that companies' distinctiveness accounts for such variation. It is important to state here that such companies' differences emerge when their mean value is deducted from the overall mean.

More so, it is important to distinguish the effect of ownership from other factors such as royalty payments, quantity of output produced and the operating expenditure. Table 2 below presents a two sample t-test on the sampled companies based on their ownership type; that is the JVCs (=1) and the non-JVCs (=0). We tested the following hypotheses:

> H_0: Average cost of production of non-JVCs is not more than the average cost of production of JVCs.
> H_1: Average cost of production of non-JVCs is more than the average cost of production of JVCs.

Analysis of variance was conducted in order to decide whether the variances assumed are equal or not (see Table 2). The essence of doing this is to find out whether or not sampling distributions of the two groups have similar or different standard errors, because the difference (if any) between the two sample variances is one out of many possible differences. The test for equality variances used is as follows:

$$F = S_1^2 / S_2^2 \tag{8}$$

This means that the ratio of variances has an F-distribution with the denominator degrees of freedom calculated as in $n(1 - 1)$ and the numerator degrees of freedom calculated as *n2 – 1*. So, the following null hypothesis was tested, which states that the variances between the two groups are the same:

$$H_0: \sigma_1{}^1 = \sigma_2{}^2$$
$$H_1: \sigma_1{}^1 \neq \sigma_2{}^2$$

From the results obtained in Table 2 below, (F = 4.66, P-value = 0.0311) we can reject the null hypothesis and accept that there are differences between the two group of companies.

We now consider the extent to which production cost per barrel of oil is affected by other factors such as OUTPUT, OPEX, ROYALTY, and Government ownership (ownership).

Table 2. Bartlett's test for equal variances.

	Ownership type (1=JVCs, 0=non-JVCs)	Summary of cost per barrel of oil produced (Mean)			
	0	25.366283			
	1	12.912724			
	Total	18.447639			
	Analysis of Variance				
Source	SS	df	MS	F	Prob > F
Between groups	37221.8707	1	37221.871	4.66	0.0311
Within groups	7741996.02	970	7981.4392		
Total	7779217.89	971	8011.5529		

$chi^2(1) = 869.8327$ $prob>chi^2 = 0.000$

An F-test for joint significance of the independent variables was conducted and the following results were obtained with F =654.34 and p-value = 0.0000. The essence of conducting the F-test is to ascertain which of the variables to be included and which ones to be excluded. Therefore, we tested whether at the same time the coefficients are all equal to zero. The results provided us with the evidence that we can reject the null hypothesis which postulates that at the same time these variables are all equal to zero; hence, our decision to include all the variables in our model.

We now present our models below after the relevant diagnostic tests were conducted:

$$lcostbbl_{it} = \alpha + \beta_1 loutput_{it} + \beta_2 lopex_{it} + \beta_3 lroyalty_{it} + \beta_4 own\_loutput_{it} + \beta_5 own\_lopex_{it} + \beta_6 own\_lroyalty_{it} + \varepsilon_i + \vartheta \quad (9)$$

Table 3 below provides us with regression results from our models. The fixed effects model, with an overall R^2 of 0.82, explains a considerable amount of variation in the cost efficiency of the upstream oil and gas companies operating in Nigeria. Crude oil production (output) with a coefficient of -1.00917 has a negative relationship with the cost per barrel of oil produced. That is production cost reduces with every increase in a barrel of oil produced. This is in line with the economies of scale theory, that companies take advantage of cost reduction due to their size (throughput).

Table 3. Regression results.

	OLS Model		Fixed-effects Model		Random-effects Model	
Variables						
	Coeff.	*t-test*	*Coeff.*	*t-test*	*Coeff.*	*z-test*
loutput	-0.998	-96.02*** (0.000)	-1.009	-28.39*** (0.000)	-9.999	-32.11*** (0.0000)
lopex	1.015	78.98*** (0.000)	1.017	28.57*** (0.000)	1.016	32.85*** (0.0000)
lroyalty	0.034	22.83*** (0.000)	0.033	4.25*** (0.003)	0.034	11.33*** (0.000)
own_loutput	0.199	2.40*** (0.017)	0.215	0.93 (0.378)	0.203	1.22 (0.223)
own_lopex	-0.269	-4.14*** (0.000)	-0.262	-1.18 (0.273)	-0.272	-1.75 (0.079)
own_lroyalty	0.091	4.69*** (0.000)	0.098	5.29*** (0.001)	0.090	9.74*** (0.000)
_cons	-0.242	-2.18** (0.029)	-0.394	-1.43 (0.191)	-0.249	-1.79* (0.073)
N		972		972		972
F-test		4901.64		162.64		6331.84
R-Sq/Wald		0.858		0.8225		0.8225

*Note: ***, ** indicate significance at 1% and 5% level respectively.*

This relationship is found to be significant at 1% (p-value < 0.05 = 0.000). This indicates that for every additional barrel of oil produced there is a reduction in the production cost by 1.01%. However, government ownership does not have any significant effect (p-value > 0.05 = 0.378) on the quantity of crude oil produced by the companies and in return does not reduce cost (-1.009167 + 0.21575 = -0.79342).

On the other hand, operating expenditure has a positive (1.01793) and significant (p-value < 0.05 = 0.000) effect on the production cost. This indicates that an increase in operating expenditure by one dollar increases cost of production by 1.02% for the non-JVCs. On the other hand, the JVCs spend less than the non-JVCs per barrel of oil produced 0.75562 (1.01732 + -0.26231). Therefore, an increase in operating expenditure by the JVCs increases the cost per barrel by 0.75% unlike in the case of non-JVCs where the cost per barrel increases by 1.02%.

Spending patterns of the companies and the control mechanisms put in place to monitor such patterns greatly contribute to how much is spent per barrel of oil produced. Consequently, the operating expenditure in the upstream oil and gas operations proves to be one of the contentious areas. In this context, the agency theory issue becomes useful in explaining the need for enhanced monitoring mechanisms in the upstream operations. Therefore, government ownership proves to be effective as a control mechanism as argued [20]. In this context, a cooperative relationship between the government and the IOCs may be more productive than a contentious relationship that may be detrimental to their success as argued by this paper.

On the other hand, it can be argued that the higher cost per barrel of oil produced by non-JVCs is due to the problem of information asymmetry because government cannot confirm whether the inputs used by the IOC are the best chosen for the output. Hence, we can reject the null hypothesis and accept that government ownership in the JVCs has a significant and systematic effect on the companies' cost efficiency.

Similarly, royalty has a positive and significant effect on the production cost per barrel of oil, with a coefficient of 0.33599 (p-value < 0.05 = 0.003). However, we can see that the JVCs pay more royalty 0.131889 (0.03359 + 0.09829) than the non-JVCs (0.03359). This may be attributed to the disparity in the different royalty rates paid by the upstream oil and gas companies based on their area of operations. Overall, we can see that government ownership has a significant effect (p-value < 0.05) on the production cost per barrel of oil produced by the JVCs.

5. Conclusions

Revenue enhancement is one of the major reasons advanced in the argument on why government participates in upstream oil and gas operations. This is largely because government increases its take by obtaining ownership in the companies involved in upstream operations. On the other hand, it is argued that government participation in the upstream oil and gas operations reduces the efficiency of such operations, thereby discouraging investment by the IOCs.

In Nigeria for example, government participates in upstream oil and gas operations in what is commonly known as JV operations. Government owns a stake in the JVCs which operate alongside other companies (non-JVCs). This paper investigated the effect of such government ownership in the JVCs on their cost efficiency. Findings indicate that non-JVCs spend twice as much as the JVCs in producing a barrel of crude oil.

Our findings are in line with the assumptions of agency theory that agent performs differently based on its ownership right on asset. Considering the assumption that agent's ownership right on an asset influences the agent's actions ex-ante, it is argued here that the JVCs have an optimal incentive-system in such a way that the IOCs ownership in the oil resources mitigates the potentials for adverse selection and moral hazard problems. Similarly, government ownership in the JVCs provides the government with representation in managing the affairs of the JVCs, which in itself is a strong control mechanism in ensuring efficient operations.

Findings of this paper indicate the importance of government ownership in upstream oil and gas operations in Nigeria. These findings are not in line with the argument that government ownership in upstream operations result to inefficient operations by the companies with government ownership. On the contrary, findings of this paper indicate that government ownership really matters in improving production efficiency of the upstream oil and gas companies operating in Nigeria.

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United Kingdom

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Thursday, 30 October 2014
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Location

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DD1 1HG Dundee
United Kingdom

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TS3: Small Group Teaching: "How to facilitate student learning."

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Wednesday, 15 October 2014
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Location

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Name

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Payment status

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Type

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Payment Status

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Location

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Event

Research Student Workshop - RefWorks Advanced

RefWorks

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Wednesday, 1 May 2013 from 13:00 to 14:00 (BST)

Type

Research students

Payment Status

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Location

Seminar Room A, level 3
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Friday 7th September 2012, 12.30-7.30pm

VENUE: University of Edinburgh, Business School, 29 Buccleuch Place, Edinburgh, EH8 9JZ

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Sunusi Ahmad

University of Abertay

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Admit One

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Presenting Yourself, Presenting your Research

These courses were part of the Scottish Graduate School of Social Science Summer School held in Edinburgh in June 2013

[redacted]

Professor Graham Crow
Director, Scottish Graduate School of Social Science

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on

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Professor Susan McVie, Director of AQMeN

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[redacted]

Signed by: ROWENA JACOBS
Workshop Tutor
Centre for Health Economics
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attended the four day training workshop

Regression Diagnostics and Model Building in Stata

organised by the

Applied Quantitative Methods Network (AQM*e*N)

on

28^{th} – 31^{st} May 2013

at

The University of Glasgow

[redacted]

Professor Susan McVie, Director of AQM*e*N

AQMeN

Applied Quantitative Methods Network

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

This is to certify that

Sunusi Ahmad

attended the two day training workshop

egression Modelling for Categorical Data (SGS Summer School)

organised by the

Applied Quantitative Methods Network (AQM*e*N)

on

10th – 11th June 2013

at

The University of Edinburgh

[redacted]

Professor Susan McVie, Director of AQM*e*N

AQMeN

Applied Quantitative Methods Network

E·S·R·C
ECONOMIC
& SOCIAL
RESEARCH
COUNCIL

This is to certify that

Sunusi Ahmad

attended the two day training workshop

Stata Fast Track Workshop

organised by the

Applied Quantitative Methods Network (AQM*e*N)

on

4th – 5th June 2013

at

The University of Edinburgh

[redacted]

Professor Susan McVie, Director of AQM*e*N

UNIVERSITY
of
ABERTAY DUNDEE

ENGLISH FOR STUDY
2012-13

Semester 1

This is to certify that

Sunusi Sa'ad Ahmad

has completed an eight week course in

Writing For Business Students

September - November 2012

[redacted]

Principal & Vice-Chancellor